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Contributions of articles by hospital pharmacists, or by others interested in the progress of this important branch of the public health profession, will be accepted if they are of general interest to those in hospital pharmacy. The editors reserve the right to revise all material submitted, if necessary.

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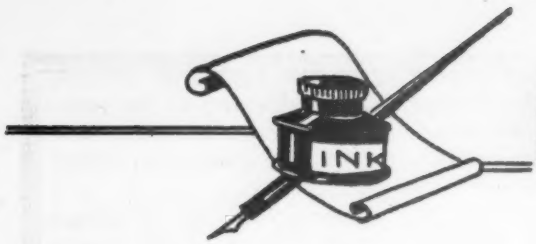

CORRESPONDENCE

Dear Sirs:

Some of your members have called the attention of our representatives to the reproduction of the paper on the evaluation of organomercurial germicides in your January-February number of THE BULLETIN. We were wondering if you or your readers would be interested in the comments of some of the people who are responsible for the organomercurials that are offered as germicides.

There are no adverse comments to make on the work done and reported by Morton, North, and Engley. The work is apparently carefully done and properly interpreted by the authors in their summary. One may criticize somewhat the general tenor of the body of the paper. While the authors do not say so, the paper apparently gives many readers the impression that the group of organomercurial germicides is of no value. Even Doctor Smith's editorial, which appeared in The Journal A.M.A. with the article, helps readers to get the same general impression. You may have noticed that the news releases of "Science Service" actually made the statement that these authors had proved that the mercurial germicides were of no value.

We would like to point out to you that what the authors of the paper proved, and all they proved, was, in so far as our preparation Metaphen is concerned, that the 1-500 aqueous solution did not always kill Hemolytic streptococci. We have known for many years that, in an aqueous menstruum, a 1-500 dilution of Metaphen is right at the border of the killing range against Gram-positive cocci. If the authors of the paper had made their tests against Gram-negative cocci, they would have found that the germs were killed very promptly and in much higher dilution.

In working with the Gram-positive organisms, one finds that the metallic germicides, especially the mercurials and the silver salts, are adsorbed on the surface of the bacterial cells, and from the surface penetrate only slowly into the protoplasm. This particular property of the Gram-positive cells is apparently identified with the nature of the membrane around the cell. The nature of this membrane which makes it retain the Gram-positive-stain likewise makes it tend to retain the mercury on the surface.

Under ordinary circumstances, once the mercurial germicide is adsorbed on the surface of the cell, it slowly penetrates the protoplasm and kills the cell, but there is a period following the adsorption on the surface when the mercurial can be removed from the surface, leaving the cell uninjured. The mercurials or silver germicides may be removed from the surface of the cells by sulfides, by the thioglycollates, which are likewise sulfur compounds, by high dilution, or they may be selectively adsorbed with activated carbon.

If, instead of using the Metaphen in an aqueous menstruum, one uses an alcohol or alcohol and acetone menstruum, the penetration of the bacterial cell by the mercurial is very rapid. Furthermore, when you use the Tincture Metaphen, you are using a solution of Metaphen two and one-half times stronger than was used in the investigation which has been reported.

Tincture Metaphen has been subjected to many laboratory tests which show that it is of value for this particular work. Let us tell you about the tests that have been made by the Nungester technique.

In brief, the tail of a white mouse is dipped into the culture of virulent pneumococcus of Type I. The culture is allowed to remain on the tail for about one minute and the tail is then placed in the disinfecting tincture. Any excess is wiped off with gauze. The clipped abdomen of the mouse is then opened, and at the end of three minutes one-half inch of the tail is clipped off with scissors and implanted into the peritoneal cavity. The cavity is sutured and the mouse observed for five days. In a series of tests using twenty-five mice for each drug, Tincture Metaphen gave 76% survival. The tincture of another popular mercurial gave 12% survival; of still another one also containing a cresol derivative, 48% survival was obtained. The tinctures of quaternary ammonium compounds showed from 28 to 64% survival; while in the controls, where no disinfectant was used, all mice died within the 5-day period.

Metaphen Disinfecting Solution contains only 1-2500 of Metaphen, but it contains other ingredients, particularly benzyl alcohol, that make the Metaphen penetrate quickly through the membrane of the Gram-positive cells, and the killing effect is much greater than one would presume.

For your assurance we want to tell you about some work done in this laboratory which has been reported both to the Council on Dental Therapeutics of the American Dental Association

(Continued on page 132)

EDITORIAL

INSTITUTE ON HOSPITAL PHARMACY

The continued wholehearted response of the Society's membership to the Institute on Hospital Pharmacy indicates the fundamental need for educational programs of this type in hospital pharmacy. Registration for this year's Institute to be held in Princeton, New Jersey, June 28 through July 2 has far exceeded the maximum of 130 who could be accepted. Unfortunately it has been necessary to turn down more than 35 applications because of the lack of accommodations. While it is always a disappointment for those who, after a great deal of difficulty finally make arrangements to attend, it is nevertheless a token of commendation to those responsible for the program when the response is so great.

Such a demand insures continuation of the Institutes on Hospital Pharmacy. These educational programs fill a need not met by conventions, local or regional meetings, and everyone in hospital pharmacy should make plans to attend in the near future. It may be necessary and desirable to plan more than one Institute a year so that those in all parts of the country may have the opportunity to attend and to participate in these outstanding assemblies.

Representatives of the American Hospital Association, the American Pharmaceutical Association and the American Society of Hospital Pharmacists are again to be congratulated for once more bringing the Institute to fruition. Special thanks are due to A.S.H.P. President, John Zugich and his hard working local committee for arranging an outstanding program.

THEY SAID IT COULDN'T BE DONE

Minorities sponsoring causes in which they believe make most of the policies of democracies. The truth of this is again apparent when we learn that pharmacists in Veterans Administration as of January 3, 1946, possessing a permanent civil service status are eligible for promotion without regard to educational requirements providing they have the necessary experience requirements and are recommended for promotion.

Congratulations are in order for those two or three V. A. pharmacists who refused to believe that "nothing could be done" and, with little or no aid from organized pharmacy, planned and successfully carried out their fight against almost insurmountable odds. It is through their efforts that pharmacists in the Veterans Administration are eligible for promotion even though they may not have a Bachelor of Science degree. It is indeed an accomplishment to successfully carry out such a program in spite of the lack of financial support and with but little personnel.

The new ruling regarding promotion refers only to those pharmacists possessing a permanent civil service status as of January 3, 1946 and in no way alters the standard of a bachelor's degree required for new employment as pharmacist in the Veterans Administration.

AFFILIATED CHAPTER ACTIVITIES

It is heartening when one visits meetings of affiliated chapters of the ASHP to see the enthusiasm with which the cause of hospital pharmacy is pressed foreward. Among the most enthusiastic and hard-working chapters is the Southeastern Hospital Pharmacists Association which at its recent meeting in Biloxi, Mississippi saw to it that hospital pharmacy was well represented in the General Assembly of the Hospital Conference with the presentation of two papers. This, in addition to its own fine program for hospital pharmacists. The S.E.H.P.S. is exerting a splendid influence on the practice of pharmacy and each year succeeds in extending its program for the betterment of pharmacy service.

DON E. FRANCKE, *Editor*

Coal Tar Products

By Alex Berman, Staff Pharmacist
New York University Clinic

HISTORY OF THE USE OF COAL TAR PRODUCTS INCLUDING SUMMARY OF DEVELOPMENT OF PREPARATIONS FOR DERMATOLOGICAL USE.

In a study of crude coal tar and allied substances made by Obermayer and Becker[10] in 1935, the authors defined the term "tar" as "any product obtained by the destructive distillation of organic substances." This definition is not entirely satisfactory since obviously there are other products obtained in this way. A better definition might be "any of various dark-colored viscid products obtained in the destructive distillation of certain organic substances."

Prior to the tenth revision of the U.S.P., "Tar," or "Pix Liquida" was used to designate Pine Tar. Even in the present N.F., the element of ambiguity persists in calling rectified pine tar oil "Rectified Tar Oil" and the ointment using this product "Compound Tar Ointment."

Tars employed in dermatology may be placed in four main groups:

1. Crude coal tar
2. Wood tars: juniper, beech, birch, pine
3. Sulfonated bituminous tars
4. Petroleum tars

All these tars differ markedly from each other in their physical, chemical and pharmacological aspects.[10]

The important role of crude coal tar in present-day dermatology makes it by far the most valuable of the tar substances. White[4], probably the first dermatologist to employ this medication in the United States, hailed it as "one of the greatest dermatological contributions of modern times." Combes[19] states that "Crude coal tar is one of the most useful of topical remedies according to most dermatologists." An evaluation given by Ormsby and Montgomery[16] credits this drug as "one of the most valuable local agents used in cutaneous disorders . . ." The addition of Coal Tar to the U.S.P. XIII for the first time constitutes additional recognition of this medication.

Acceptance of this substance as a valuable therapeutic agent has been accompanied by the recognition that it is disagreeable in a physical, cosmetic and esthetic sense. More important has been the variation of composition of coal tar due to changing methods of manufacturing illuminating gas and metallurgical coke and methods of fractionating with a view to obtaining coal tar derivatives. This has presented serious pharmaceutical and therapeutic problems, the attempted solution of which has been continuous and may be readily seen by perusing the literature.

Although coal tar has been used for the treatment of cutaneous disease for more than half a century, it was not until 1916 that it was admitted to the N.F. IV as Pix Lithanthracis along with Coal Tar Solution (Liquor Carbonis Detergens). Fischel[1] is generally credited with the first specific reference to coal tar in a paper written in 1894. A few years later, other European dermatologists, notably Sack in 1896, Lestikow in 1900 and Dind in 1906, as quoted by Brocq[2], spread favorable reports about coal tar to the clinics of Europe. By that time, 1909, Brocq[2] had written an exhaustive and authoritative paper which recommended coal tar for a variety of dermatoses, described its physical and chemical properties, manufacture and pharmacology, and put this medication on a firm basis in Europe. White[3,4] was quick to follow in the United States with an enthusiastic report of Brocq's work and confirmation of the efficacy of this substance in the treatment of many dermatoses including infantile eczema.

MANUFACTURE AND COMPOSITION

The composition of coal tar depends upon the process and material (bituminous or anthracite coal, shale, lignite, etc.) used in its manufacture, the temperature maintained, the time used to obtain fractions, and other factors.

Generally speaking, modern production of metallurgical coke and illuminating gas, is carried on by the destructive distillation of bituminous coal at temperatures ranging from 1000-1300°C. The resulting yield of coal tar is about 3% of the weight of coal used.

It is interesting to note that some one hundred twenty-two compounds have been identified as being derived in the process of fractionating and refining coal tar from coke ovens.[18] Many of these compounds are of theoretical interest only, while others, identified in minute amounts after processing tons of tar, are not yet available. Limitation of space and the scope of this paper preclude a complete tabulation. For convenience, the following breakdown is presented:[20]

1. Light oil: (up to 160°C) 0.2-2% of tar
   Benzene, toluene, xylene are the chief products.

2. Middle oil (160° - 230°C) 10-12% of tar
This consists principally of naphthalene and phenol, together with small amounts of pyridine and quinoline.
3. Heavy oil (230° - 270°) 8-10% of tar
This consists of cresols, methylnaphthalenes, naphthols, xylenols, quinoline, isoquinoline.
4. Anthracene oil (270° - 360°) 18-23% of tar
This comprises phenanthrene, anthracene and other solid hydrocarbons.
5. Pitch (56-60% of tar)
The residue remaining in the still.

To appreciate the variable nature and composition of medicinal coal tar, certain facts must be borne in mind. The early European dermatologists employed a coal tar which was the residue of anthracite coal. When the illuminating gas industry was in its infancy, this substance was used to paint wood, iron, rope, roofing, brickwork or stone, as well as acting as a protective coating against weather and fungi. At the present time, coal tars differ not only from each other, but in addition from the type recommended by Brocq, Jabon, Dind, Jadassohn, and other European dermatologists[12].

Modern and older methods of tar production, as well as American and Continental processes have been evaluated by Combes[12,13]. It appears that the adoption of more efficient methods in the manufacture of illuminating gas has resulted in the production of coal tars which vary in composition and in general are unsuitable for medicinal purposes. The principal changes are an increase in the middle oil fraction, especially of the naphthalenes, which are cutaneous irritants, while the anthracene oil fractions are from 35-50% below the requirements of a good medicinal tar. Combes points out[13] that a basic difference between coal tar of British and Continental origin and American tar is that European tar is often the residue of low temperature carbonization in which horizontal retorts are used, a method which American industry has largely discarded.

The distinction between a low temperature tar, one that is collected around 450-500°C, and a high temperature tar which is obtained between 1000° and 1300°C is important, since dermatologists agree that only the former should be used. The latter, which is so prevalent in this country, usually contains as much as 11% naphthalenes and is considered irritating[10,13].

Low temperature or primary tar ("Urteer") has the following characteristics[13]:

1. It is usually a dark brown liquid, orange or red, with an odor of hydrogen sulfide, mercaptans and phenols; never of naphthalene as found in high temperature tars.
2. The reaction is alkaline, in contrast with high temperature tars which vary from pH 6.2 to 7.
3. On rare occasions, particularly when brown coal or lignite is the parent material, it may be solid at room temperature, owing to the presence of solid paraffins.
4. Low temperature tars have a tendency to impart a red color to any water that comes in contact with them, particularly if the water is alkaline.

One more factor should be pointed out as contributing to the variable nature of coal tar. It has been observed that many companies dealing in tar products purchase coal tar from various sources, such as coke ovens and illuminating gas plants. All the tar acquired in this manner is then indiscriminately poured into large vats and mixed. If any is desired for medicinal purposes, a portion of this mixture is heated to 70°C to remove the water[13]. Needless to say, the composition of different batches of such a tar will vary considerably.

Apparently, no provisions have been made in the U.S.P. to define limits in the variations occurring in present day coal tars, nor to differentiate between high and low temperature tars.

PHARMACOLOGY

Recognizing the esthetically disagreeable nature of coal tar and its variable chemical and physical properties, workers have attempted to isolate its active fractions, remove its black color and incorporate it in a suitable base.

Beginning with Fischel[1,10] who extracted the ether-soluble and benzol-soluble fractions in 1894 (liquor anthracis simplex Fischel), down to the recent work of Nelson, Osterberg, Jaffrey et al,[6,7,10] the attempt to reach these objectives has been continuous. Today many dermatologists are convinced that while some of these modifications are useful, no fractionate, distillate, liquor, filtrate or tincture has exhibited the wide range of therapeutic activity of the crude substance[10,19].

Making allowances for different sources, crude coal tar has the following pharmacological actions[10,12]:

1. Antipruritic, probably due to the presence of phenols and cresols.
2. Vasoconstrictive, keratoplastic, antiparasitic effects believed to result from the presence of methylnaphthalene, dinaphthalene, naphthol and sulfur.
3. Photosensitizing effect due to the presence of acridine.
4. Astringent effect in 0.1% dilution.
5. Reducing action. It abstracts oxygen from

the skin, thereby inhibiting mitosis and resulting in a numerical and dimensional decrease in the cells of the rete malphigii and corneous layers[12].

The photosensitizing effect of coal tar is unique, not being possessed by any of the other tars. For this reason, it is employed in the Goeckerman treatment of psoriasis to sensitize the skin to ultra-violet radiation[5,8-11].

Although Cook[10] and his co-workers discovered a carcinogenic substance in British shale, namely 1:2 benz-pyrene and Block and Widmar succeeded in producing carcinoma in mice with those coal tar fractions obtained between 230° to 300° C, there is reported in the literature no carcinogenic action following therapeutic use of coal tar. Its tendency to cause folliculitis is well known. In that event, its use should be promptly discontinued. Prolonged use should also be avoided because of the danger of sensitization.

Crude coal tar has proven effective in many dermatoses including[12]:

1. Infantile eczema
2. Occupational dermatitis, dermatitis venenata (contact dermatitis)
3. Dermatophytosis
4. Varicose eczema
5. Dermatitis hiemalis
6. Pityriasis capitis
7. Pruritis ani
8. Psoriasis (Goeckerman treatment)

PHARMACY

To obtain the total effect of crude coal tar, it has been the practice among many dermatologists to incorporate it in an ointment. A classic example is the following ointment formulated by C. J. White[3,4]:

Crude coal tar	8.0
Zinc oxide	8.0
Corn starch	60.0
Petrolatum	60.0

White recommended that the zinc oxide be mixed thoroughly with the coal tar, the starch with the petrolatum. These two pastes should then be carefully worked together. This procedure, according to White, produces a smooth, homogeneous mixture which is black or nearly black. Any other method of preparation is not acceptable.

This tradition of compounding has persisted a long time. Many dermatologists refer their patients to pharmacists who dispense their zinc oxide-coal tar pastes with a black or nearly black color.

Dr. Downing, working in collaboration with pharmacists Ohmart and DiCicco at the Massachusetts College of Pharmacy, challenged this tradition in 1944[14]. They levigated the zinc oxide with a portion of the base, added successively the remainder of the base, the starch and finally the coal tar. Depending on the sample of tar used, this method produced a grey or grey-green product which was considered superior in texture to the black product obtained by White's procedure. In a clinical evaluation of the former product, results showed "no significant difference in the response to the two preparations."

An interesting sequel to the Downing report was provided by a communication sent to the Arch. Dermat. & Syph. in August 1944 by Sharlit[15]. The following passages are quoted: ". . .There are two groups of substances in coal tar. Both are black; but one is stable, and the other readily turns a chocolate brown on contact with water and air. Mixtures of black and brown give greenish shades, an olive drab color. May I suggest a simple experiment for those of my colleagues who seek experimental proof of this fact.

"Add thoroughly mixed crude coal tar to the extent of 20% to an anhydrous hydrophilic base - let us say to an oxycholesterol - petrolatum base. The finished product is jet black. To a portion of this mixture add water, and rub it in. The mixture gradually assumes an olive drab color. Some years ago, I succeeded in separating these two coal tar fractions. I then thoroughly satisfied myself that the stable black fraction is useless and contains the gritty portion of the tar. The unstable fraction is the therapeutically active one. It follows that rather than seek for a crude coal tar salve that is jet black or object to one that is greenish (containing the brown fraction) dermatologists should welcome one that is more or less free of the stable black fraction; that is to say, they should welcome a chocolate-brown product rather than a jet black one."

An interesting development has occurred with the appearance on the market recently of a low temperature crude coal tar.* This product has been clinically evaluated by Combes[19] in the dermatological wards at Bellevue Hospital and found to possess all the pharmacological effects of a good coal tar with the following unique advantages:

1. colloidal and water miscible
2. miscible with collodion, fixed oils, glycerin, pastes and fatty bases
3. easily removed from linen with soap and water

*"ZETAR" manufactured by Dermik Pharmacal Company, Brooklyn, New York.

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Polymyxin*

A Note on Experimental and Clinical Investigations

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In May 1947, Benedict and Langlykke [1] reported that sterile culture filtrates of Bacillus polymyxa in dilutions of 1:1,000 inhibited the growth of Brucella bronchiseptica in culture. Shortly after this report, Stansly, Shepherd and White[2] independently described the isolation of an antibiotic substance from B. polymyxa which they named "polymyxin." This antibiotic was shown by them to be effective only against gram-negative organisms in vitro, and to possess a high degree of therapeutic activity against experimental infections produced in mice by the inoculation of Klebsiella pneumoniae or Pasteurella multocida. It was also effective against experimental fowl typhoid infections in chicks. Subsequently, Stansly and Schlosser [3] established the identity of polymyxin as a new antibiotic and developed a method for its bio-assay. Not long after the two original reports on this antibiotic appeared, Ainsworth, Brown and Brownlee [4] announced that they had isolated an antibiotic, active against gram-negative organisms, from cultures of Bacillus aerosporus Greer. To this agent they gave the name "aerosporin." Recently, Brownlee and Bushby [5] have described in detail the bactericidal, toxicologic and pharmacologic properties, and experimental therapeutic effectiveness of aerosporin, while Swift [6] has reported that this antibotic is of some value in the treatment of whooping cough in children. Although polymyxin and aerosporin are derived from similar micro-organisms, recent comparisons of the two products suggest that they are dissimilar in chemical composition. [7]

We wish to report briefly upon the experimental and clinical observations which we have made during the past six months with polymyxin (hydrochloride). This antibiotic in vitro is most effective in an acid medium, is relatively heat stable and loses little of its activity in the presence of serum. The strains of Escherichia coli, Aerobacter aerogenes and K. pneumoniae which have been tested are susceptible to 0.3 microgram of polymyxin per cubic centimeter when an inoculum of 200,000 bacilli is used. Pseudomonas aeruginosa is slightly more resistant to this antibiotic, while the strains of P. vulgaris and N. intracellularis so far tested in vitro appear to be completely resistant. Polymyxin in its effective concentrations appears to be bactericidal in its action on susceptible micro-organisms. Like Stansly et al. [2], we have found it was impossible to produce resistant strains from susceptible organisms in vitro.

The acute toxicity of polymyxin was determined in mice by single subcutaneous injections and the LD 50 was found to be 50 to 300 mg. per kilogram. While dogs survived single intravaneous injections of 10 to 15 mg. per kilogram of body weight, single intravenous injections of 25 mg. per kilogram produced death. Dogs tolerated 5 and 10 mg. of the antibiotic per kilogram when given injections twice daily by the intramuscular route for seven days. Intrathecal injections of 1 and 5 mg. of the drug in dogs produced no untoward reactions, while 10 mg. produced transient paresis of the hind legs.

Ninety minutes after dogs had received single intramuscular doses of 5 and 10 mg. per kilogram, serum concentrations of 2.5 and 5.0 micrograms of polymyxin per cubic centimeter were recorded. Three and one-half hours after these doses, serum concentrations of 2.5 and 1.25 micrograms per cubic centimeter were noted. When dogs were given 5 and 10 mg. of the compound per kilogram twice daily for seven days, serum concentrations of 10 to 20 micrograms of polymyxin per cubic centimeter were observed. The antibiotic was not detected in the spinal fluid of dogs in which high serum concentrations of polymyxin were present. When polymyxin was administered to human beings in divided doses by the intramuscular route at intervals of three hours in amounts not to exceed a total daily dose of 3 mg. per kilogram of body weight, concentrations of 0.6 to 1.3 micrograms per cubic centimeter were noted in the serum after twenty-four hours of therapy. Detectable amounts of polymyxin began to appear in the urine twelve hours after the initiation of the dosage schedule just described. After twenty-four hours of its administration, effective bactericidal concentrations of the antibiotic were found in the urine. In 1 person, suffering from purulent meningitis and treated with polymyxin, none of the agent was detected in the spinal fluid.

As is shown in the table, single doses of 1 mg. of polymyxin per kilogram of body weight administered by the subcutaneous route protected the majority of mice which had been previously infected by the inoculation of 1,000 minimum lethal doses of either K. pneumoniae (type A) or Hemophelus influenzae (type B) by the intraperitoneal route. These results confirmed previous observations on the therapeutic effectiveness of this antibiotic in experimental gram-negative infections. [2] Comparable experimental infections treated with streptomycin in doses of 1 or 5 mg. per kilogram of body weight were used as therapeutic controls. Under the conditions of the test, polymyxin appeared to be five to ten times more effective in the control of these experimental infections than was streptomycin. Furthermore, it has been noted that while neither a bacteriostatic nor bactericidal effect could be demonstrated against Neisseria intracellularis in vitro, polymyxin had a definite curative effect in experimental meningococcic infections in mice. This paradox is being investigated.

From the Department of Preventive Medicine, The Johns Hopkins University School of Medicine.
Presented before the Johns Hopkins Medical Society, March 8, 1948.
These investigations were supported by grants received from Abbott Laboratories, Eli Lilly and Company, Lederle Laboratories Division, Parke, Davis and Company and the Upjohn Company.
The polymyxin was furnished by the Lederle Laboratories Division, American Cyanamid Company.

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TABLE 1.—*Comparison Of Streptomycin and Polymyxin*

Drug	Dose, Single (Subcutaneously) Mg./Kg.	Inoculum*	Deaths on Day Indicated 1	2	3	4	5	6	Survivals After Six Days Number	Per centage Total
Control	—	K. pneumoniae† Type A	10	–	–	–	–	–	0	0.0
Streptomycin	1	K. pneumoniae Type A†	1	4	9	1	–	–	5	25.0
	5		–	–	3	–	–	–	7	70.0
Polymyxin	1	K. pneumoniae Type A†	–	–	1	2	–	–	17	85.0
	5		–	–	–	–	–	–	20	100.0
Control	—	H. influenzae Type B‡	9	–	–	–	–	–	1	10.0
Streptomycin	1	H. influenzae Type B‡	16	–	–	–	–	–	4	20.0
	5		2	–	–	–	–	1	7	70.0
Polymyxin	1	H. influenzae Type B‡	–	1	–	–	–	–	19	95.0
	5		–	–	–	–	–	–	20	100.0

*In all instances 1,000 lethal doses were given.

†K. pneumoniae, type A, was injected intraperitoneally.

‡H. influenzae, type B, was injected intraperitoneally in 5 per cent hog gastric mucin.

Polymyxin in total daily dosages of up to 5 mg. per kilogram of body weight, given in a special buffer solution (*pH* 7.4) at intervals of three hours has been used to treat patients seriously ill with infections due to Pseudonionas aeruginosa, K. pneumoniae, Hemophilus pertussis, and Brucella abortus. To date, the results have been such as to demonstrate clearly that polymyxin has a therapeutic effect against infections produced by these organisms in human beings. Too few patients have been treated to make any definite statements in regard to the clinical toxicity of polymyxin. One instance of fever, possibly due to the drug, has been noted. Other toxic reactions undoubtedly will occur.

CONCLUSION

Polymyxin is a new antibiotic uniquely and highly active in vitro against certain varieties of gram-negative micro-organisms. Its acute toxicity in experimental animals is considerably greater than that of penicillin or streptomycin. After intramuscular injection of the antibiotic, it promptly enters the blood stream, but it does not pass the blood-brain barrier. It is excreted slowly in the urine.

In certain experimental infections produced by the inoculation of gram-negative organisms in mice, polymyxin appears to be definitely more effective than streptomycin. The results following its use in certain types of clinical infections produced by gram-negative bacilli are interesting. However, careful clinical trials of this compound in selected and suitable types of infections must be made before the therapeutic effects of polymyxin can be evaluated.

Coal Tar Products (continued from page 102)

4. quickly removed from skin and hair with water
5. this tar does not impede exudation sweating and evaporation from cutaneous surfaces, thus reducing the incidence of tar acne and pustular folliculitis.

The writer has prepared ointments with this product at New York University Clinic pharmacy, and its incorporation in fatty, hydrophilic and washable bases is accomplished with ease. Ointments are greenish-brown or brown in color. The colloidal and water miscible properties of this tar permit its use in aqueous vehicles.

SUMMARY

1. A brief review is presented of the history of coal tar over the last fifty years and the problems resulting from variations in its source and manufacture.
2. Because of the variations in composition, it would appear pertinent that the U.S.P. define more strictly the limits of variation. A low temperature retort coal tar is indicated for dermatological use.
3. A new product is presented which appears to provide a solution for the coal tar problem.

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Increasing NET PROFIT In Your Pharmacy

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Before I begin I should like to clarify several points:

1. It is a fact that hospitals in general are operated as non-profit institutions. Whereas the hospital may be a non-profit institution, we cannot fail to recognize the pharmacy as one of the revenue departments. This revenue may not be a profit in the end to the hospital but may be re-applied to the services offered by the hospital, such as charities, equipment, etc.

2. It is a very debatable question as to whether the pharmacy itself should keep records of accounting procedures or whether this is the duty of the main office in the hospital. In this paper I shall endeavor to point out the advantage to the pharmacist of making some such record even if simple or obtaining this record from the main bookkeeping office. The advantage lies in the fact that only through records can we definitely determine profit and definitely determine increase in net profit in the pharmacy.

3. It is also a very debatable question as to whether a discussion of this type would be of any value to the strictly charitable institution where no charge is made to any patient. In answer to this, even though the institution operated on a charity basis only, the buyer of drugs who is usually the pharmacist must inadvertently play a leading role in keeping down the expense of operation. Most of us operate on a part charity basis and a part pay-patient basis. It is this type of institution which I shall discuss.

In order to clarify our subject we must start at the very beginning of accounting. We have three statements of major importance. They are the Asset and Liability Statement, the Profit and Loss Statement and the Funds Provided and Funds Applied Statement. Of these three statements which the accountant prepares for your institution, the pharmacy plays its most important part in the Profit and Loss Statement. We can now define the term "Net Profit" in a very simple manner, in fact so simple that you may consider it naive.

Sales less Purchases = Gross Profit
Gross Profit less Expenses = Net Profit

From the above you can easily see that we can increase net profit in three ways:

1. By increasing sales.
2. By decreasing purchases.
3. By decreasing expenses.

These few simple facts may seem like first grade arithmetic to you. However, the proper manipulation of these simple little figures may prove of unknown value to you, to your profession and to your hospital.

Now, let's take each figure on this statement and analyze it from the standpoint of net profit.

The first is sales. Of course, I will grant you the fact that should we increase sales we will increase net profit. However, we in the hospitals are not in the business of merchandising but are rather concerned with the other two items, purchases and expenses. Sales in the hospital have been confined generally to a rather set amount owing to the number of beds in the hospital and to the number of patients admitted to clinics. Actually there is no field for selling. The pharmacist is concerned primarily with keeping the cost of drugs to the hospital and to the patients at a minimum but is ever vigilant to the matter of keeping profits at a maximum. Therefore, we shall omit an analysis of sales.

The second figure deals with purchases or cost of goods sold. This is called the application of funds provided by sales. Now we can decrease the cost of goods sold in several ways, namely:

1. By keeping the amount of purchases at a minimum.
2. By correlation of professional knowledge and knowledge of accounting so that the

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cost of routine procedures may be kept at a minimum and the cost of drugs to patients can be kept at a minimum.

3. By manufacturing as many items as are profitable.
4. By keeping in touch with the market in buying.

There are many other ways which may come to your mind but the enormity of the subject will not permit excessive elaboration. I would like to discuss these four points further.

1. By keeping the amount of purchases at a minimum. This can be done in four ways:

a. By purchasing in bulk quantity an additional discount can be obtained which sometimes amounts to 10 or 20% of net value.
b. By purchasing directly from the manufacturer special discounts to hospitals can be secured. Certainly we should take advantage of these.
c. By obtaining bids from manufacturers on competitive items and buying from the lowest bidder who has a quality product.
d. By contract buying from certain manufacturers who offer special discounts on such items as ampuls and narcotics when placed on contract.

These principles are very familiar and this will serve only as a reminder of these facts.

2. By correlation of our professional knowledge and our knowledge of accounting so that the cost of routine procedures may be kept at a minimum and the cost of drugs to patients can be kept at a minimum.

No person in the hospital is more capable of reading and keeping in touch with the newer procedures of disinfection, protein administration, vitamins and intravenous injection than the pharmacist. No person in the hospital is more capable of advising the medical and nursing staff of the best possible procedure from both a therapeutic and financial standpoint than the pharmacist. Therefore, why shouldn't we put this knowledge to work?

When I mention this fact I am reminded of an incident which occurred in our own hospital. It is also true in other hospitals. In the operating room they were using a certain germicide for a process called "Wet Sterilization of Instruments." This germicide cost us $3.00 per gallon. It is a common one on the market. The operating room used approximately 12 gallons per month or 144 gallons per year, which amounts in money to $432.00 per year.

Through some of the professional literature, it was found that a certain group of germicides could be used which would be equally as effective, were more rapid and efficient in action and were less undesirable since they had no odor and were non-poisonous. At the same time this group of germicides could be purchased at a net cost of $0.20 per gallon, $2.40 per month and $28.80 per year.

Now there is a lot of difference between $432.00 and $28.80 per year. In fact about $403.20 or enough to buy a good second-hand automobile in 1941. Thus a small item has now become a large item.

A decision was made to bring this matter to the attention of the administrator and the staff. When advised of said fact, they were astounded. If we had saved $403.20 every year for 10 years we would have some $4,032.00. That is enough to any badly needed equipment for the hospital. Now this particular germicide was not available ten years ago but it was available 7 years ago.

You may say, "Whose job should it have been to inform the hospital of this fact?" It is not the doctors'. He does not care what germicide is used provided it is effective. It is not the nursing staffs'. They do not read as extensively as this. It is of no interest to the patient. His operating room fee is set and there is no extra charge for the germicide used. And strictly speaking it was not the job of the pharmacist. Yet, who was in a better position to protect the interest of the hospital both professionally and financially than the pharmacist?

However, for all these years no one had cared enough to correlate their professional knowledge and their knowledge of the cost of the germicide to benefit themselves, their hospital or their community.

This was, indeed, a matter of extreme importance. When presented, instead of merely stating the medicinal advantages of this new germicide, it was discussed not only as a therapeutic advantage but as an increase in net profit. Thus, such a small thing, just a little advice to the staff and the administrator led to a substantial gain for the hospital.

Now, let's take keeping the cost of drugs at a minimum for the patient.

Many physicians who are kept constantly on the go are unable to devote much time to the actual study of all proteins or vitamins on the market. The pharmacist is in an excellent position to read not only the professional literature regarding the subject but to also make close contact with the flucutating prices and thus advise the physician not only as to the therapeutic content of certain proteins or vitamins but also the value in dollars and cents. Sometimes, if it be possible, it might be suggested to him in terms of selling price just what drug will give the patient the maximum value therapeutically at the

minimum cost.

In so doing you can gain the confidence and trust of the physician and at the same time win the smile of the patient when he is presented the bill. This all adds up to a good word for you, for your hospital and a service to your community.

So, let's correlate our professional knowledge and our knowledge of profit and loss.

3. By manufacturing as many items as are profitable. Please note that we use the word "profitable," not "possible."

It has been pointed out many times that tablets, ampuls of thiamin, vials of normal saline and vials of distilled water can be compounded at relatively little cost to the hospital. When we decrease the cost of goods sold, whether it be in a pay-patient institution or a charitable institution we increase net profit. I shall not endeavor to discuss these items further.

However, when we start to manufacture we should add up the following on each product manufactured:

1. Cost of ingredients.
2. Depreciation of equipment.
3. Expense in labor.

If these three items add up to less than the current purchase price then manufacture is the answer.

I should like to mention here too the enormous profits which can be derived by the manufacture of large volume parenteral solutions. This can prove to be about 95% profit if operated efficiently. Ninety-five per cent profit in any department means increase in net profit.

At the present time there is some controversy due to the reactions which patients may get from these manufactured solutions. However, with the proper training and background on the part of the operator these discrepancies can be overcome and the hospital can realize a financial buoyance from this department. The cost of ingredients is small. The initial cost of equipment is large but we do not consider the initial cost in calculating profit but rather the depreciation of this equipment. Labor is the most outstanding factor. You will find that profits will soar if this department is installed. If you plan to build, consider this.

4. By keeping in touch with the market in buying.

By this I refer to the various fluctuations on the markets and to the surplus properties recently offered by the government. For instance, when the grain market fluctuated to its highest level it was only reasonable to believe that the price on both rubbing and grain alcohol would rise. It did. If you had only taken a tip from your Sunday paper or from your weekly magazine you might have anticipated this and been in a grand position to buy or advise your purchasing agent to buy.

This is only one example. There are many others. So as you read your morning paper or the recent periodicals look for your chance. It will be there.

We cannot pass from a discussion of purchases without mentioning inventory. I have purposely omitted this item from this paper. It is a rather complicated entry in accounting and plays a part throughout all three statements. It will suffice to say that we increase the cost of goods sold when we increase the amount of our inventory.

The last item on our list is expenses. If we reduce expenses we increase net profit. Expenses usually include such items as:

1. Salaries and Wages
2. Charities
3. Supplies
4. Depreciation of Equipment
5. Repairs and Maintenance
6. Utilities
7. Administrative Expense

As far as the actual amount of salaries and wages, it would be a difficult question for me to answer. However, no manufacturing, purchasing in bulk or other operation should be attempted in the pharmacy without ample consideration for the possibility of increasing personnel. Any increase in personnel must be amply covered by an increase in net profit. So until you show that your additional pharmacist or apprentice can mean not only a service to the hospital but also an increase in net profit you have little argument for more personnel.

As for charities, many of you may consider it unfair to take charities off expenses. Unless there is some fund to cover charities, where else can it appear on a Profit and Loss Statement? This question may be debatable.

In order to keep this figure of expenses at a minimum and thus increase net profit it is an excellent suggestion to have a Committee on Pharmacy appointed from the medical staff. This committee could function with your pharmacist to prepare a special formulary for these indigent patients. This formulary should contain only those drugs which can be purchased at a minimum. No drug could be used on charity patients except those included in the formulary unless special permission were granted by the committee, the administrator and the pharmacist. In this manner expenses on charities could be kept at a minimum with a maximum value therapeutically to the patient.

As for Supplies, Depreciation of Equipment,

Repairs and Maintenance, Utilities and Administrative Expense little can be said. We can only use these services wisely and efficiently to reduce expenses.

So there you have it. By decreasing purchases and decreasing expenses in the hospital we increase net profit. IT'S NOT WHAT YOU MAKE, IT'S WHAT YOU SAVE. That little rule applies not only to your life but to big corporations and to hospitals as well.

Let's think about and talk about NET PROFIT.

A general approximation for a monthly Profit and Loss Statement for the pharmacy in a 200 bed hospital where the hospital operates with a majority of pay-patients but carries a group of 30 beds for charity.

STATEMENT OF INCOME

	Per Day	Per Month	
Sales			
In-patients	$300.00	$9,000.00	
Out- patients (Cash)	100.00	3,000.00	
Large Volume Parenteral Solutions	150.00	4,500.00	
Total Sales	550.00		16,500.00
Less Cost of Goods Sold			
Purchases - net amount		5,400.00	
Freight Expenses		30.00	
Inventory at Beginning of Month		10,000.00	
Total		15,430.00	
Less Inventory at End of Month		9,500.00	
Total Purchases			5,930.00
GROSS PROFIT			10,570.00
Less Expenses			
Salaries and Wages		1,000.00	
Charities		4,500.00	
(Taking all drugs dispensed to charity patients - $5.00 per day for 30 beds)			
Supplies (Forms, pencils, soap, laundry, etc.)		25.00	
Depreciation of Equipment		125.00	
Repairs and Maintenance		25.00	
Utilities		25.00	
Administrative Expense		50.00	
Other Expenses		50.00	
Total Expenses			5,800.00
NET PROFIT			$ 4,770.00

Note: These figures are only approximations and do not represent any known hospital pharmacy.

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Antithyroid Therapy

A COMPARATIVE DISCUSSION OF ANTITHYROID THERAPY INCLUDING A REVIEW OF WORK ON THIOURACILS ALONG WITH LIST OF REFERENCES.

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The mechanism of the production of the thyroid hormone, thyroglobulin, and its utilization as thyroxin has always been partly conjecture. Recently, there have been concentrated experimental efforts in glandular physiology. Williams[1] has reviewed those concerning the thyroid gland and has advanced the following: The thyroid gland is activated by the thyrotropic hormone which is elaborated by the anterior lobe of the pituitary. An excess of this hormone affects the gland (a) by producing in it an increase in cellular multiplication, hence a hypertrophy (goiter), (b) by increasing its production of thyroglobulin, and (c) by accelerating the rate of thyroglobulin breakdown and subsequent liberation of thyroxin into the bloodstream.

Normally, thyroglobulin exists only in the thyroid gland. The molecule is too large to permit its entrance into the blood vessels. A proteolytic enzyme present in the thyroid gland is responsible for the liberation of thyroxin from thyroglobulin.

The role of iodine in thyroid physiology is important and its several biochemical functions have furnished fertile field for controversy. Iodine is liberated from the iodides in the blood by another enzyme, and oxidase, present in the thyroid gland. This iodine may effect the following phenomena: (a) it initiates a reaction with tyrosine, and amino acid, which ultimately produces thyroxin and thyroglobulin, (b) it can inhibit the proteolytic liberation of thyroxin from thyroglobulin, and (c) it can inhibit the action of the thyrotropic hormone on the thyroid gland.

In the "normal" individual, the thyroid hormone is, along with many "other factors," responsible for the "normality." A quantitative disturbance of this hormone's production produces characteristic alterations from the "normal," depending on the status of "other factors" and whether the disturbance represents an increase or decrease. The chief diagnostic criterion is the variation of the basal metabolic rate (BMR).

The therapeutic agent utilized in the management of thyroid hypoactivity is the dried gland itself. In hyperactivity, the correction or management involves a more complicated program. It may be approached from several angles: surgery, drug therapy, psychotherapy, roentgenotherapy of the pituitary and/or the thyroid glands, and combinations of these methods.

DRUG THERAPY

Management of hyperthyroidism by drug therapy[2] has been accomplished with dried thyroid gland, iodine and iodides, and derivatives of thiourea and thiouracil.

Therapy with the dried gland is of course paradoxical and is probably explained on the basis of the iodine content of thyroid substance.

The rationale for therapy with iodine is probably based upon its ability to inhibit the thyrotropic hormone. Thus, the activity of the thyroid gland in its production of thyroglobulin is depressed. The variable results obtained by this therapy depend upon the competitive actions of iodine stated above along with its relative concentration with concentrations of thyrotropic hormone and the oxidase that liberates iodine from iodides.

It is thought that the thiouracils and related compounds control thyrotoxicosis (hyperthyroidism) either by inhibition of the oxidase production of iodine for the manufacture of thyroid hormone or by reacting with the iodine after it is formed. The former is thought more likely. At any rate, the hormone production is depressed which produces an explanation for one of the undesirable effects of this therapy: stimulation of

the production of the thyrotropic hormone is responsible for the thyroid hyperplasia. It seems logical to presume that the production of the thyrotropic hormone is stimulated when there is a low concentration of thyroid hormone.

THIOURACIL

It has been observed by experimenters and clinicians that certain drugs produced goiterogenic symptoms. Among the classes of compounds that depress thyroid activity are the aminobenzenes including the sulfonamides, aminothiozole, thioureas, and thiouracils.

It would seem well that pharmacists keep in mind the fact that sulfonamides have antithyroid activity,[3,4] sulfadiazine[5] being the most active. Liberman's work[6] indicates that the sulfonamides depress the thyroid gland by the same process as the thiouracils. He showed further that the bacteriostatic effect of the sulfonamide was inhanced greatly by admixing with certain thiouracil compounds. Sulfanilamide, for example, when mixed with equimolecular proportions of methylthiouracil gave the activity of sulfathiazole against pneumococci in mice. Another investigator[7] stated, however, that concomitant sulfonamide and thiouracil therapy increased the risk of leukocyte depression.

Thiourea and aminothiozole appear to have about the same effect as the more recently developed thiouracil compounds. They differ chiefly in potency and toxicity. The accomplished results are the same. In a series of 129 cases of thyrotoxicosis reported by Perrault and Bovet,[8] only 15 patients developed reactions. In seven, symptoms were so severe that therapy was discontinued. The dosage used was 0.2-0.4 Gm. daily and untoward symptoms included drug fever, erythema, urticaria, digestive intolerance, lumbar pain, and oliguria. Morgans'[9] report on several drugs including thiourea and aminothiozole showed no leukopenia or agranulocytosis, but a higher degree of drug fever, rash, nausea, and halitosis.

Thiouracil, the drug which attained favor over thiourea and aminothiozole, at least in this country has been used extensively and was accepted by the 1947 NNR. Studies on Thiouracil by Moore[10] and VanWinkle[11] on 1,091 and 5,745 patients respectively, illustrate the overall picture of toxicities when employing this drug.

Thiouracil is three times more potent than thiourea as determined in rats. Apparently, however, it is chosen in preference to thiourea because the latter imparts a characteristic unpleasant odor to the breath. In therapy, before the BMR falls to normal there is usually a latent period of up to 4 or 8 weeks especially if iodine has been given previously or concomitantly. Other objective and subjective improvements may appear much earlier.[12] The optimum daily dose as set forth by Raveno[13] is 0.4-0.6 Gm. daily; larger doses, 0.8-1.2 Gm., are no more effective. The drug blood level is kept up best by giving divided doses rather than administering in one daily dose.

The chief untoward reactions obtained by Van Winkle et al, and Moore in their studies on thiouracil may be of interest:

	VanWinkle 5,745 cases	Moore 1,091 cases
agranulocytosis	2.5% (14% died)	1.74% (26% died)
leukopenia	4.4%	3.4%
drug fever	2.7%	4.9%

In the cases of agranulocytosis there was no evidence that the size of the daily dose had any relation to the incidence of this side effect. Seventy per cent of all agranulocytosis reactions occurred during the first eight weeks of therapy. The recommended therapy for this reaction is, in addition to the abstinence of thiouracil, the administration of 500,000 units of penicillin daily along with repeated blood transfusions. There is no evidence that vitamins or pentnucleotide influenced the disease.

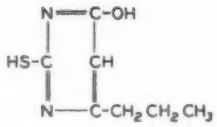
A diagnosis of leukopenia was made when the white blood cell count dropped below 4,000 but the differential count remained within normal limits. Since leukopenia is a part of the agranulocytosis syndrome, much care must be taken to keep from losing sight of the danger that might be involved. Here, too, the size of dose did not seem to affect the incidence of this reaction. The time relation of leukopenia to the therapeutic program followed that of agranulocytosis.

In cases of drug fever, also a possible symptom of agranulocytosis, there was no relation to the size of dose and its occurrence. Drug fever also occurred, chiefly during the early part of the therapeutic program.

SUBSTITUTED THIOURACILS

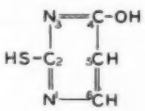
Efforts to produce a compound having antithyroid activity without the toxicities of thiouracil have long been under way. Hundreds of compounds have been investigated[14,15] and at least two of these, 6-methylthiouracil and 6-propylthiouracil, have been used widely because of their lesser toxicity and greater potency when referred to thiouracil. Here, too, the qualitative results appear to be the same as with the more toxic compounds.

Methylthiouracil, according to Barfred[16], was a Danish contribution in 1944 and has been used clinically in Denmark ever since. It has enjoyed some usage in other European countries and Australia and recently has been employed to some



(6-n-PROPYL-2-MERCAPTO-4-HYDROXYPYRIMIDINE)

PROPYLTHIOURACIL



(2-MERCAPTO-4-HYDROXYPYRIMIDINE)

2-THIOURACIL

degree in therapy in America.

In a review by Thompson[17] of 700 cases treated with high doses of methylthiouracil (0.6-1 Gm. daily), agranulocytosis was found in nine cases. All of these patients recovered after therapy was discontinued. The potency of methylthiouracil has met with some controversy of opinion due to the difference in the metabolism of the drug in man and test animals. Barfred indicates that it is effective in the same doses as propylthiouracil (25-200 mg. daily).

Currently, the antithyroid drug of choice appears to be propylthiouracil. Further studies on methylthiouracil and other compounds might alter this status. The order of toxic reactions attending the use of propylthiouracil is about 10 per cent;[18] and for thiouracil about 13 per cent.[19] The reactions to propylthiouracil have been consistently mild without incidence of agranulocytosis. So safe has it appeared that in many studies routine determinations of white blood cells have been discontinued. It is still stressed, however, that patients report immediately any unaccountable fever, coryza, and sore throat. One case of severe leukopenia has been reported in propylthiouracil therapy[20] and there is certainly no assurance that others or even agranulocytosis will not occur.

The dosage as described by Astwood and VanderLaan[21] is 75-150 mg. daily for the initial period and 25-50 mg. daily for maintenance therapy. The dosage for each patient must be adjusted according to his response.

FATE OF THIOURACILS IN THE BODY

Thioureas and thiouracils[22-24], are rapidly absorbed from the gastrointestinal tract. About 15 per cent of the ingested amount is destroyed by the secretions of the stomach, duodenum and jejunum; it is not affected, however, in the ileum. Most of the drug when absorbed reacts with proteins of the cells and can be found in all body tissues at autopsy. Approximately 50 per cent of that absorbed is broken down by the tissues; and 30 per cent is excreted unchanged in the urine. There is none excreted in the stools. Thirty minutes after ingestion of 0.1 Gm. of thiouracil in a fasting individual, the maximum amount was found in the blood. Blood levels were higher if daily doses were given in divided quantities than when taken in a single dose.

Substituted thiouracils having stronger antithyroid powers than thiouracil were found to accumulate in the body to a greater degree than did thiouracil; but no correlation between potency and accumulation could be established. It was noted in rats[25] that substitutions in the 6 position of the thiouracil nucleus increased the antithyroid activity while substitutions in the 5 position decreased this activity. Examples of the former are 6-methylthiouracil and 6-propylthiouracil; and an example of the latter is 5-methylthiouracil (thiothymine). It is to be remembered that while effects of drugs in test animals is a good indication of the action in man, it does not necessarily follow that all factors are identical in both systems.

INDICATIONS AND CONTRAINDICATIONS TO ANTITHYROID THERAPY

Prior to the commercial availability of thiouracil, more than 5,000 patients had been treated in controlled studies.[26] This is an example of the modern trend of requirements made on new remedies before they are made available to the medical profession at large.

The rate of improvement in all cases is not constant. Some patients respond only after 4 or 5 months of therapy. A normal BMR is expected, however, in from one to three months. This is often prolonged if there is concomitant administration of iodine which is indicated along with an antithyroid drug before thyroidectomy. These drugs produce a hypervascularity in the thyroid gland. This condition is corrected by the administration of iodine.

Antithyroid drugs have been employed in all types of hyperthyroidism; but their use is chiefly recommended in disease of short standing where the patient has a small goiter and mild symptoms. This category is usually considered "cure" possibilities. Therapy is of course desired in all poor surgical risks and in relapse

after subtotal thyroidectomy. It has also proven of great value in those patients who refuse operative intervention and in severe disease where surgery is indicated, complete drug control with a thiouracil and iodine has been found advantageous.

The "cure" possibility in antithyroid therapy is spoken of by most clinicians as an uncertainty. There have been remissions of varying lengths of time in most studies reported in the literature. The general opinion appears to be that the therapy is too recent to think of "cures" in terms of anything more than a hoped for possibility.

Antithyroid drugs may be contraindicated in pregnancy since thiouracil is also absorbed by the fetus as determined in rats by Williams. Sexton,[29] however, reported two women who went through pregnancy without untoward results while taking thiouracil. Further, the drug is secreted in the milk and hence is contraindicated in lactation since it can cause great harm to the child.

Antithyroid drugs are contraindicated in patients who won't or can't cooperate with a rigid therapeutic routine, in intrathoracic goiter, and in thyrotoxicosis due to acromegaly.

CONCLUSIONS

Therapy with propylthiouracil is alleged to be about as safe as surgery practiced by the most skilled surgeons. This therapy[30] actually produces a physiological rather than an antomical thyroidectomy. In addition, the pituitary gland displays histological changes similar to those after thyroidectomy.[31]

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REACTIONS TO INTRAVENOUS ADMINISTRATION OF SOLUTIONS *

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Despite the fact that many articles have appeared concerning the cause and elimination of pyrexial reactions after the administrations of solutions by vein, there still remains much lack of knowledge on the part of physicians and hospital personnel, so that these reactions still occur with a frequency inexcusable in the light of present day knowledge. Since most of the articles have appeared in technical or surgical journals they have escaped the eye of most of those responsible for the production of solutions and the care of tubing and needles, and therefore the application of the known successful methods of avoiding reactions has not become widespread. Commercial houses have, in general, attempted to correct the situation, but too often contact is made only with a purchasing agent who looks at the increased cost of material presented and refuses to buy it until forced to by the medical staff's complaints about reactions.

Seibert [1] in 1923 demonstrated that the substance responsible was the product of bacteria which exist in river water and in tap water. She proved that the material passed through the ordinary distilling apparatus but could be separated by spray-trapping devices.[1a] To this I added the principle of multiple baffle plates and deconcentrator tubes.[2] Triple distillation is not so effective in eliminating pyrogen, but will remove most of it. In 1932, following our publications many commercial firms began to prepare for sale pyrogen-free solutions. A biologic test was added—observation of leukocytes and temperature in rabbits after injection of test amounts intravenously, and therefore commercial houses now put out pyrogen-free solutions of all types. In hospitals where solutions are prepared by technicians and nurses this principle of proper distillation is often unknown or disregarded with disastrous results. Other methods have been devised, especially that of Co Tui [3] by adsorption filtration through asbestos filters, but none of these have become commercially applied.

The care of glassware and tubing remains the predominating factor in production of reactions. Those responsible for their care and preparation frequently know little of the facts, and often type of rubber and other factors are blamed which have nothing to do with the problem. The main fact is that tap water is the source of contamination, and any glassware or tubing rinsed or washed in tap water will produce pyrogen unless sterilized within an hour. Glassware in commercial houses is washed and sterilized simultaneously by use of steam jets. In hospitals it is too often simply rinsed, and distilled water and drugs are introduced into it and sterilized at the leisure of those concerned, which leads to gross contamination and production of pyrogen before sterilization is done. One must remember that bacteria themselves do not produce reaction, but their toxic products will do so. It has recently been demonstrated that the film of moisture within an ordinary intravenous needle can produce enough pyrogen to cause a reaction if grossly contaminated with tap water.

Similarly tubing rinsed with tap water and allowed to lie around in the laboratory will become contaminated in an hour's time. One may well wonder why all intravenous treatments are not attended by reactions if the principle of immediate sterilization after washing is not carried out, but one must remember that concentration of pyrogen-producing bacteria varies in various tap water and is increased if the water is stagnant in pipes for some time. Several commercial houses have attempted to prevent these tubing reactions by furnishing pyrogen-free disposable tubing, either cellophane or rubber, and as long as these are used with pyrogen-free solutions reactions can be eliminated. These sets are, however, rather expensive, especially when a great deal of solution is used. Pyrogen is readily soluble and can easily be washed out of tubing and glassware by simple distilled water—so that tubing, needle and glassware can be easily cleansed of it—but immediate sterilization must follow such preparation. The old method of boiling in sodium bicarbonate wastes time and does not eliminate all pyrogen and reactions.

Another frequent source of difficulty, if all these methods are followed by hospitals preparing their own solutions, is the accumulation of pyrogen in distilling apparatus. This factor produces sudden epidemics of reactions. In commercial preparation the need for cleaning apparatus is discovered by the biologic assay—Without this an arbitrary time for cleaning the apparatus must be set—at sufficiently frequent intervals to prevent these epidemics of reactions.

Much has been written concerning speed shock, and these writings are heeded to such an extent that interns and residents often introduce fluids so slowly that three to four hours are often used for one infusion. This causes great discomfort to the patient and often defeats the purpose for which the medication is given. Such slowly given fluids will not, for instance, correct hypochloremia if the patient loses more chloride from gastric drainage or vomiting than the infusion supplies. In all the intravenous solutions which I have seen administered, I have never seen speed shock if cardiac reserve is adequate. It is true that if pyrogen exists in solutions or tubing slow introduction may prevent a reaction if the concentration of pyrogen is low enough, but in pyrogen-free solutions administered through pyrogen-free sets, this should not be a factor.

Finally, if tubing or needles are suspected, the simple expedient of rinsing them and wasting 100 cc. or so of the solution will, because of the extreme solubility of pyrogen, prevent reaction if pyrogen-free solution is used. This was suggested by me in 1930,[4] and yet has received little attention.

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 (Con't on page 133)

A SECTION OF THE STORAGE ROOM OF THE PARENTERAL SOLUTIONS UNIT
ST. JOSEPH HOSPITAL, MEMPHIS

I. MANUFACTURING PROCEDURES

The theme of this Second Institute in Hospital Pharmacy can be divided into three parts:

1. The application of good business principles to the conduct of the hospital pharmacy.
2. Basic factors in good purchasing and their application to practical problems in the hospital pharmacy.
3. The position of manufacturing in the hospital pharmacy with reference to its economic value to the hospital.

These three parts constitute the thinking of this Institute which is, obviously, economy.

I congratulate those who have formulated this curriculum on their excellent judgment in the selection of these topics for our consideration at this time. Never has it been more important that hospital administrators take stock of their institutions and the individual departments of these institutions than it is today, because economists tell us that inflation is here.

There was a time when most hospitals could depend upon the generosity of their friends to finance them during periods of insecurity such as we now have. Public opinion, however, is beginning to regard hospitals as business enterprizes; and is becoming less indulgent towards those which are not self-sustaining. I would therefore go so far as to say that the perpetuity of our present system of non-profit hospitals is dependent upon an economic program consisting of:

1. A careful scrutiny of the hospital balance sheets with a view to the eradication of economical errors.
2. A scrutiny of the balance sheets of each department for the same reason.
3. An economic "tightening of the belt" in all departments of the hospital.

The question arises--just how does the pharmacy fit into such a program?

From an administrative viewpoint the answer is simple. A hospital must necessarily be divided into a number of departments. Some of these are self-sustaining and others are not. If the institution is to subsist, there must be a balance between the revenue-producing and the non-revenue departments. Furthermore, there must be a surplus which will allow for improvements and new equipment. In general, room rent

*Presented at the Second Institute on Hospital Pharmacy, Chicago, 1947.

PARENTERAL FLUIDS Prepared in the Hospital Pharmacy*

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from patients will do little more than offset the expense of nursing care. The administrative, dietary, housekeeping, engineering, and maintenance departments are non-revenue producing. The pharmacy, laboratory, x-ray, surgery and anesthesia departments are revenue-producing and must be depended upon to support the expense departments and to obtain a surplus for expansion and improvements.

Thus we see that the financial stability of our hospitals depends much upon us as pharmacists. I do not believe I am exaggerating when I say that we can do more to effect economy in the hospital than can anyone in our institutions, provided we have the support of our administrators. There are several ways by which the pharmacy department can increase its revenue. One of these is simply by earning more money through an increased turnover of stock. This may mean keeping the hospital prescription business in the hospital; or it may entail an improvement of the pharmacy service so that physicians can obtain what they need for their patients. The old saying, "A dollar saved is a dollar earned," suggests a second method of increasing the pharmacy revenue--a carefully planned manufacturing program. The manufacture of solids and external liquid preparations have already been ably discussed here today; it now remains for me to convince you that the Manufacture of Intravenous Liquids can be a practical, profitable, and fascinating achievement for hospital pharmacists.

Many similarities exist in a program for making parenterals which are found also in the manufacture of other pharmaceuticals. Both require planning, manufacturing equipment, and a source of raw materials. There must be carefully worked out formulas, controls and checks; and certainly, both require pharmaceutical skill. The essential difference is that parenterals must be prepared under conditions which will produce final products of such quality that they can be injected into body tissues or into the blood stream with impunity. Whether the hospital is large or small high quality fluids can be prepared economically if certain fundamental principles are observed. The commercial companies and many hospital pharmacists have demonstrated this truth. Commercial companies have neither the monopoly of chemicals, equipment, nor of the procedures for obtaining pyrogen-free solutions. We have prepared them in our hospital for the past five years without experiencing any reactions; and we have no secret materials, equipment, nor magic procedures. I am outlining for you today our secret of success, and any detailed information I may overlook because of the time limit is also yours for the asking.

HOW TO AVOID SOLUTION TROUBLES

We attribute the success of our parenteral solutions manufacturing program to the following:

1. Pharmaceutical supervision:
   (a) of the formulas prepared
   (b) of the procedures
   (c) of the cleaning processes
   (d) of controls
2. Exacting cleanliness:
   (a) of the manufacturing room
   (b) of flasks and other glassware
   (c) of rubber tubings
   (d) of flask closures
   (e) of stored chemicals
3. Routine cleaning of the water still.
4. Careful selection of chemicals.
5. Production of a pure, pyrogen-free distillate which is checked electrically before and after each operation of the still, and which is sterilized within 8 hours.
6. Accurate measurements:
   (a) of original chemicals
   (b) of the finished solution
7. Controlled sterilization process guided by exhaustline thermometer readings.
8. Hermetically-sealed flasks.
9. Prompt and proper labeling.
10. Inspection and checking of finished products.

SUPERVISION

Approximately twenty years ago, surgeons returning from the First World War were enthusiastic in their praise of a newer therapeutic procedure they had used in the army - the intravenous infusion of saline and dextrose solutions.

In many instances, they persuaded surgery supervisors to prepare some for use in civilian hospitals, undoubtedly because the only autoclaves in the institution were located in the operating rooms. Very few pharmacists of those days had technical training and the majority of hospitals had no pharmacist at all. However, the "Drug Room" did have a scales, so, if there was a pharmacist, his only contribution to this pharmaceutical manufacturing procedure was the weighing of the sodium chloride and the purchase of dextrose ampuls. In the light of present day knowledge, we know that those solutions were not properly prepared; but doctors who were enthusiastic over their own project were more prone to tolerate "reactions." Furthermore, the number of flasks made was minimized because the administration of intravenous fluids was somewhat of an heroic measure. Two decades have brought about many changes. The hospital "Drug Room" is bowing out to the Hospital Pharmacy. Many states have enacted laws which are putting Registered Pharmacists in every pharmacy. A pharmacist entering the profession during the past ten years is in command of both professional and technical knowledge which is invaluable to the hospital. While he may be willing to collaborate with other trained hospital personnel in order to share equipment or to otherwise effect economy, he is not satisfied just to purchase one gram salt tablets for some other department's employee to drop into a "solution." Above all, he is not going to assume responsibility for such solutions, and he is the only person in the hospital legally qualified to do so. Doctors have changed too. Intravenous medications are now commonplace therapeutics and doctors are no longer tolerant of inferior products. The large number of flasks used daily makes it imperative in most instances that a definite area be set aside for this work.

One prerequisite, then, for the economical preparation of safe parenterals is the delegation of the responsibility for this work to a properly-qualified pharmacist. He may assign some of this work to others; but he may not share the responsibility.

CLEANLINESS

Cleanliness in a parenteral unit is imperative. It must commence with the personnel and radiate into everything which may come into contact with the final products. The slogan must be, "It is easier to prevent contamination than to remove it." In my companion paper to this one, I have described air filters, wall and floor coverings, and utilities which aid in maintaining cleanliness. It is equally important that all flasks, glassware, rubber connections, and intravenous sets (particularly rubber tubings) be chemically clean. This is not the glamorous part of making solutions - it is the part we may wish to delegate to others; but it is one part over which we must exercise critical supervision.

CLEANLINESS OF FLASKS: Used flasks should be submerged in a sink filled with warm tap water to remove labels and remnants of the solution. They are then placed for one minute in the automatic washer which contains hot sodium metaphosphate solution. The solution is thrown with considerable force against the inner surfaces of the flasks which scours them chemically clean. They should next be rinsed with warm running tap water to remove the detergent; then the exterior surfaces should be sprayed with freshly-distilled water and the inner surfaces should be rinsed with distillate sprayed by means of an automatic rinser. In the absence of an automatic washer, the same detergent and a good bottle brush will suffice. Thorough rinsing with freshly prepared distilled water is important. Baskets made of rust-proof wire will aid in proper draining of flasks.

CLEANLINESS OF USED TUBINGS: Rubber tubings can be similarly cleansed and must be well rinsed. If a pressure stream for the detergent and rinse is not available, it would be better to use a plastic "throw-away" tubing than to jeopardize the safety of the solutions.

CLEANLINESS OF FLASK CLOSURES: Flask closures must be given the same meticulous cleansing as flasks and tubings. Both flasks and closures should be given a final rinsing with distilled water prior to using.

CHEMICALS: As pharmacists, we are aware of the importance of selecting high quality chemicals for all purposes. This is particularly true when preparing parenteral fluids. U.S.P. chemicals are ordinarily preferred for this work and should be obtained from manufacturers whose integrity is known to us. Some of these chemicals will be purchased in drum quantities; therefore, if we do not empty a drum at once, we must guard the remainder of the chemicals against contamination.

DISTILLED WATER: Aside from the chemicals, one other substance is necessary to complete the solution, and that is a supply of distilled water suitable for parenteral use. This sounds simple, and it is; yet it may be the cause for failure in parenteral manufacturing. When we have sifted all the information the U.S.P. gives us relative to Water For Injection, we find there are only three qualities we must provide. One of these is sterility, which is ordinarily no great problem. Another is the removal of dissolved solids in the form of chlorides, sulfates, and heavy metals. The U.S.P. allows 10 parts

of these impurities per million parts of the distillate; and practically any water still in good working order will produce a distillate of this quality. There are accurate and simple methods of testing for dissolved solids other than the U.S.P. chemical tests. The third problem relative to a parenteral quality distillate is pyrogens.

This (pyrogens) seems to be the magic word which intimidates many capable pharmacists. Florence Siebert published a description of pyrogens a quarter of a century ago; and many research workers since that time have shown how they may be detected and removed from solutions; and better still, how the original contamination can be avoided. What is pyrogen? The U.S.P. XII makes only one reference to it in the form of a monograph on the rabbit test for pyrogens. It has been defined as a nitrogenous substance (exotoxin) produced by certain strains of bacteria which are usually air-borne. Ordinary sterilization will destroy the bacteria, but will enhance the pyrogen. Prolonged sterilization and higher temperatures will destroy pyrogen; but this also ruins solutions. Siebert also found pyrogens to be soluble, and the best solvent is, ironically, distilled water. Therefore, if pyrogenic water is allowed to dry on the inside wall of a clean flask, and subsequently, pyrogen-free distillate is used to prepare a solution in this flask, this solution will be pyrogenic. On the other hand, if the flask is rinsed with non-pyrogenic distillate prior to filling it with solution; the solution will be pyrogen-free because of the ready solubility of pyrogen in distilled water. Co Tui has found pyrogen to be of definite size ranging from 50 millimicrons up to less than 1 micron in size; and has demonstrated that it can be removed from solution by using adsorptive filters. It has also been shown that pyrogen-free solutions will develop pyrogens within 24 to 48 hours unless such solutions (or distillate) are sterilized within 24 hours and are hermetically sealed.

We have solved the pyrogen problem by taking only filtered air into the room; by a careful selection of a still which is designed to produce non-pyrogenic distillate; by checking the distillate electrically before and after operation of the still; by thoroughly rinsing with freshly distilled water all flasks and other utensils which come in contact with the solution; by promptly sterilizing; and by sealing our solutions under vacuum.

STERILIZATION: Proper sterilization of solutions by means of an autoclave presents only two problems. One is the proper manipulation of the autoclave. The important point to be remembered is that pressure does not sterilize - its only function is to raise the temperature up to the sterilizing range. Therefore it is only important to keep the drain line clean and make all checks for proper sterilization temperatures at the mercury thermometer placed in the exhaust line. The temperature ordinarily used is 120° to 150° C. A recording temperature meter is useful but not necessary. The second problem is how long to sterilize solutions. This will depend upon the heat-stability of chemicals and solutions as well as upon how much heat will be required to kill bacteria; however, practically all intravenous infusions in common use are fairly stable. Thin glass containers do not require as much sterilization time as thick pyrex containers such as the Fenwal flask; and small quantities do not require the time needed for large quantities. Our schedule is as follows:

1 Liter Fenwal flask - 20 minutes @ 250° F
1/2 Liter Fenwal flask - 15 minutes @ 250° F
1/2 Liter Fenwal Blood Bank Flask - 20 minutes @ 250° F
(This later flask has an extremely thick wall.)

THE HERMATIC SEAL: The stainless steel top is only lightly inserted during sterilization. It has a groove in the stem which permits "breathing" of the solution during sterilization. Immediately upon removing the flask from the sterilizer, the top is pushed completely in; and as the solution cools, evidence of the vacuum is had in the form of a clicking sound when the flask is jarred. We test all flasks for vacuum before they leave our storage room, and nurses are instructed to test each one before the solution is administered.

LABELS: It is important that attractive and correct labels be placed accurately and neatly on each flask. Our labels are of uniform size and bear only necessary information. It is understandable that labels on commercial packages which enter interstate traffic mush be more detailed than labels on packages no intended for use outside the hospital. These lables must, however, be adequate. We have selected a distinguishing color scheme for our parenteral labels which saves time and prevents errors in dispensing. We minimize the possibility of errors in labeling by manufacturing only one product at a time. Occasionally we must load two different solutions on the same sterilizer cart. In such instances we have special markers to separate and identify each.

CONTROLS: Checks to prevent errors and to assure safe solutions may range all the way from a simple inspection of the finished product to the cumbersome U.S.P. rabbit test for pyrogen. I am aware that the statements I am about to make relative to controls may make me a target for criticism; but I do not intend to misuse truth. Practice can sometimes disprove theory. Five years of successful practical experience has taught us that the time we might be expected to spend in looking for trouble in our parenteral solutions can more profitably be spent in preventing it. I am not minimizing the importance

of exhaustive checks where there is a large personnel, each contributing a part to the finished product. I also consider them extremely important when commencing a new unit or after remodeling a unit until confidence in the routine is regained. However, when one person is doing all of the work, a competent pharmacist is directing it, and uniformly excellent results are produced; why then should we not have some degree of confidence in our ability, technic, and equipment? Our controls consist of the following simple procedures:

1. The technician checks her program for the day with the pharmacist. This includes the formula, weights, and measures, and the quality of the distillate. These are noted on the control record.
2. The proper number of the correct type of labels is selected, and the control number for that batch is stamped on the gum side of the labels. If the regular technician does not do the manufacturing that day, the control number is placed on the left border of the exposed surface of the label.
3. After the still has operated for five minutes, the distillate is discarded and subsequent distillate is tested for the presence of electrolytes. This is a check upon total dissolved solids as well as an indirect check for the presence of pyrogens which accompany electrolytes. This check is repeated after all flasks are filled to determine if any condenser leaks might have occurred during the operation of the still.
4. Only U.S.P. quality chemicals are used to insure solutions against contaminations from this source.
5. Supervision of the weighing of chemicals is a check on potency. If two persons know the ingredients were added to a solution in correct amounts, then they must be there. However, even the U.S.P. allows for a plus or minus error in the potency of solutions.
6. Sterility is assured by a careful sterilizing technic, and by having spot sterility tests made in the hospital clinical laboratory.
7. The proper cleansing of flasks, tubings, and all utensils brought into contact with the solution is supervised.
8. Each flask is tested twice for breaks in vacuum, when dispensing and before administering.
9. Solutions are examined for foreign particles during the process of labeling. Our control record shows the results of all of the above checks.

Occasionally someone reports in the literature the manufacture of several thousand flasks of solution with 2 to 3 reactions. These were not likely to be reactions, they are rather individual idiosyncrasies on the part of patients. Pyrogen reactions come in batches and groups, not singly. We went through that frightening experience about 12 years ago before we learned how to avoid reactions in solutions. We know how now, and we have proved it by an unblemished five-year manufacturing record.

PROFIT IN MANUFACTURING PARENTERALS: Price in professional accomplishment may be sufficient incentive to encourage some pharmacists to undertake the manufacture of parenterals; but most of us are also interested in the financial apsect of it. There is very little in common between the manufacturing cost and the purchase cost of solutions. It should be borne in mind, however, that the hospital pharmacy does not have the overhead expenses of commercial concerns. It should also be remembered that very few hospitals can afford to pay for such overhead. The list of formulas which has been given you contains examples of what can be done in any hospital having a competent pharmacist. An effort has been made to avoid repetition for formulae presented at the first Institute of Hospital Pharmacy last year at the University of Michigan. Two observations should be made regarding the list - one is relative to the many formulas we can and may be required to make which are not available from commercial concerns. We are obliged to give this service to our doctors. The other observation is relative to the tremendous savings made possible through this type of manufacturing. Taking but one example for comparison (5% Dextrose in Physiological Solution of Sodium Chloride), it will be noted that the difference between the purchase cost and manufacturing cost is 68 cents per flask. We prepared 13,000 of these flasks alone last year, which represented a saving of $8,840.00.

It is, therefore, my conviction that a competent hospital pharmacist, regardless of the size of his institution, will find the manufacture of intravenous liquids practical, profitable, and a fascinating professional achievement.

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PARENTERAL FLUIDS Prepared in the Hospital Pharmacy

II. MANUFACTURING EQUIPMENT

There is one aspect of a parenteral fluids program which is far more important than the equipment; and it is the one most often underestimated. So important is it that I cannot discuss parenterals without first emphasizing the matter of having adequate supervision for their preparation. I know of several hospitals which have the best available equipment, but have failed to make safe intravenous fluids because the supervision of the unit was given to persons lacking the pharmaceutical knowledge necessary to cope with technical problems as they arose. Therefore, adequate supervision will contribute more to a successful parenteral solution program than will equipment. There is but one person in the hospital properly qualified to take this supervisory responsibility and that person is the pharmacist. A good pharmacist will not undertake a specialized technic without necessary space and equipment; therefore, the specifications for these will be reviewed in this paper.

LOCATION OF THE PARENTERAL UNIT

Unless we are planning this program for inclusion into a new hospital wing, it is unlikely that we shall be so fortunate as to find an ideal location; nevertheless, we know that because of the problems of supervision, the unit should be within the pharmacy or as near it as possible. This is more important in small hospitals than in large, since larger institutions usually have more than one pharmacist to share the supervisory load.

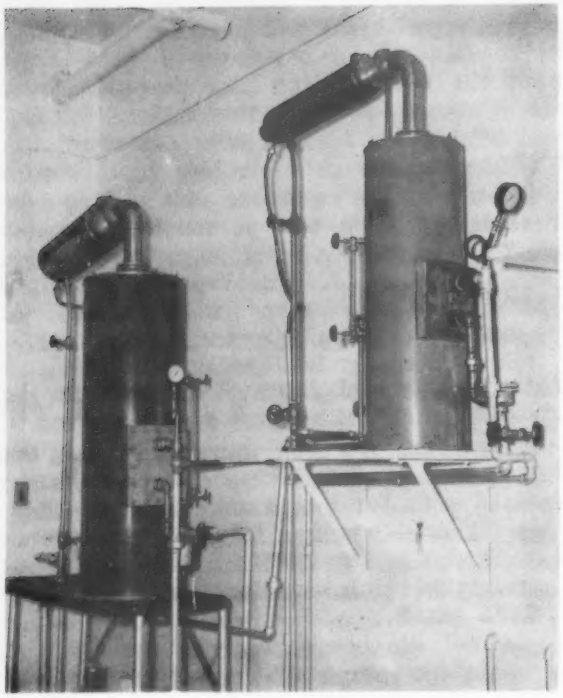
NECESSARY SPACE AND PHYSICAL FACILITIES

Several suggestions have been made as to the amount of space necessary for a parenteral solutions unit. One competent authority has said that 5 square feet of floor space for each adult bed in the hospital is necessary for the pharmacy if it does not prepare solutions; and 9 to 10 square feet per bed is required if it does. Thus, 4 to 5 square feet per bed becomes the suggested area for the parenteral unit. This is double the area we have in our unit based upon bed capacity; and we feel we have ample space for a fairly complete manufacturing program. It therefore seems that the criterion for this purpose is not the bed capacity of the institution, but rather, the volume of work which is done in the unit. We devote a total of 600 square feet to our parenteral unit, and make (on an average) 2500 flasks per month; therefore, based upon the monthly production, we are allowing 0.24 square feet per flask. The unit consists of three rooms:

Manufacturing laboratory - 27 feet x 9 feet
Sterilizer and water still room - 17 x 10 feet
Storage room - 21 feet x 9 feet

If the manufacturing load will be heavy, necessitating several hours in the unit each day, it is advisable to place the equipment which generates heat (such as the sterilizer and stills) in a room separate from the manufacturing part of the unit. This is especially important in the southern states where the climate is hotter. It is advisable to have a filtered air system in the unit, having the air introduced into the manufacturing room through the filters by means of suction fans. All other possible inlets of air (such as around window sills) should be caulked. If the heat generating equipment is in a separate room, it is preferable to draw air in to this room from an inside hall and draw it out again by means of a suction fan placed in an outside window. This removes heated air more quickly. The parenteral unit must be equipped with gas, water (hot and cold), steam, electricity (both 110 and 220 V), and with adequate sewage lines.

We have found the ideal wall covering in the manufacturing room to be a pastel green glazed tile; while gray unglazed tile is used on the floor because of the ease in cleaning. These colors are restful to the eyes.



WATER STILLS AT ST. JOSEPH HOSPITAL, MEMPHIS, TENNESSEE

FUNDAMENTAL EQUIPMENT

WATER STILL

The most important piece of equipment in a parenteral unit, from the point of view of the original selection as well as of maintenance, is the water still. It must be located in the parenteral unit so that a freshly-prepared distillate is readily available. A steam-operated still is always preferable because it operates rapidly, and because steam is the most economical source of heat in the hospital. In selecting the still, one should bear in mind that the choice of this piece of equipment will determine either the success or failure of the entire program. At one time it was thought necessary to use distillate from a double or triple still for intravenous fluids. This is no longer true. First of all, double and triple stills take up much space and are slow of operation. The cleaning of such stills is likewise cumbersome. Furthermore, it has been proven that impure water results, not because of a single distillate, but because of a dirty still. Double and triple stills become sludged as do single stills, the only advantage being that the process is slowed. There are single stills made by companies of highest repute, which are safe for parenteral use. One such manufacturer has been running full page ads in our hospital journals which state, "Not only does this still remove bacteria, organic and inorganic solids (including silica), but the distillate is free from gaseous impurities and pyrogens as well." Another ad reads, "Distillate from this still is pure enough for intravenous and blood-plasma work without danger of pyrogenic reaction." Such claims as these are not rashly made by reputable manufacturers; and if one is using this type of still, he should include such ads in his scrap-book as proof that he is using "reasonable care" in preparing solutions. Incidently "Proven reasonable care" is the hospital's legal weapon in damage suits.

We are using one 20-gallon per hour and one 10-gallon per hour auxiliary still in our unit. Both are single stills which operate on the following principle. As the water boils in the chamber of the still, the vapor rises from the surface at a low velocity through a large disengaging space. When it arrives at the baffle, it must enter through several restricted areas which step up the steam flow to a high velocity and force it to make 180 changes in direction in rapid succession. It is this rapid shifting of direction which throws back into the boiler any entrained particles or moisture droplets. Thus only dry and pure steam is permitted to enter the condenser. Such water stills range in sizes from 1 to 30 gallons per hour delivery, and in cost, from $97.00 to $604.00. We have found the operational cost to average at 0.3 cent per gallon. Before selecting a still, it would be well to request an analysis of the tap water supply in your locality as a guide for the manufacturer in recommending a still, as well as for your maintenance engineer in setting up a cleaning schedule for it.

There is always a possibility of receiving impure distillate from even the best still. This may be due to:

1. Leaks of tap water into the condenser (although this rarely occurs.)
2. Faulty operation of the still.
3. Operating a dirty still.
4. Faulty piping of the distillate. Such piping should be only of block tin arranged with a continuous fall to allow free drainage.
5. Contaminated storage tanks or contamination through subsequent handling of the distillate.

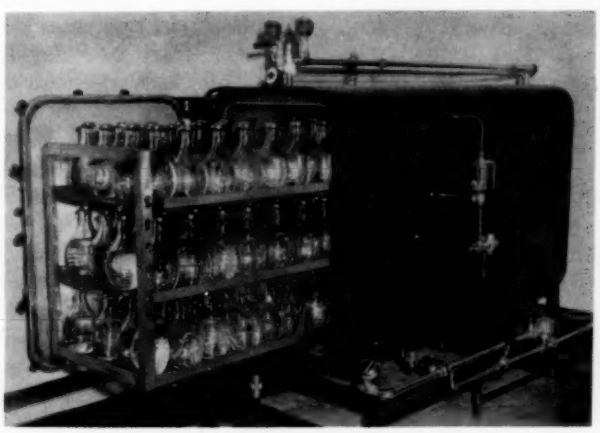
PURITY METERS

Therefore, a water-checker becomes another important part of the equipment. One of the

U.S.P. standards for distilled water is that it shall contain less than 10 parts of total dissolved solids per million part of water. We know that it is practically impossible to obtain water without any dissolved substance since pure water will even dissolve carbon dioxide from the air to which it is exposed. There are several water checkers available which operate more or less along the same general principles. The one with which I am most familiar consists of a conductivity bridge; and it measures the amount of electric conduction furnished by the solids dissolved in the water being tested. It is set with corrections to allow for dissolved carbon dioxide, and gives a direct reading of the conductivity of other dissolved solids expressed as equivalent parts of sodium chloride per million parts of water. We also know that many organic substances are not electrolytes and will not be detected as such. Fortunately, however, such organic substances are found in water in combination with electrolytes so that we can be reasonably certain of the purity of the distillate if the purity meter reading is low. Such readings should be made prior to, and at completion of the operation of the still. This purity meter is available at a cost of $40.00 without electrodes. There are several types of electrodes available; as well as devices for giving a constant visible reading and for sounding an alarm in case impure distillate is being produced during operation. Our electrodes cost $23.00 and we have found a pre- and post-operational reading sufficient for our needs.

AUTOCLAVES

After having secured a good water still to furnish an intravenous quality of water, and a purity meter to eliminate the possibility of pyrogens or at least to detect the presence of electrolytes which are the associates of pyrogens; our next piece of fundamental equipment will be one which will render the solution free from bacterial contamination. This may be done in one of several ways, but the steam autoclave is more practical for hospitals. In small hospitals the pharmacist may have no alternative to using an autoclave located in another department; but this is a serious handicap unless the sterilizer is large. In larger hospitals there should be a sterilizer located in the pharmacy; and if parenteral solutions are made the sterilizer belongs in this unit of the pharmacy. If as many as 500 to 600 flasks are prepared weekly, a large serum-type sterilizer is indicated. Out of necessity, we have used both a small and large autoclave. The small one held 20-one liter flasks, and obliged us to retain a full-time employee for 8 hours, 3 days each week. After the first two hours, the technician spent the remainder of the day "operating the sterilizer" in order to make 160 flasks. This gave us an average cost for labor alone of five cents per flask. We now have a serum sterilizer which takes 144 liter flasks at one time; and our cost for labor has been reduced to 2 1/3 cents per flask. This represents an annual saving on labor alone of $800.00, which, in itself, pays for the sterilizer within 3 to 4 years. It may also be of practical interest to compare the cost of operating large and small sterilizers. Formerly, it cost us 7 cents to sterilize 20 flasks, while it now costs us 19 cents to sterilize 144 flasks. This represents an annual saving of $70.00 on the cost of steam. Obviously, the purchase price of a sterilizer depends entirely upon the size and finish selected; but when purchasing, it is important to select one which is large enough to do the work economically.

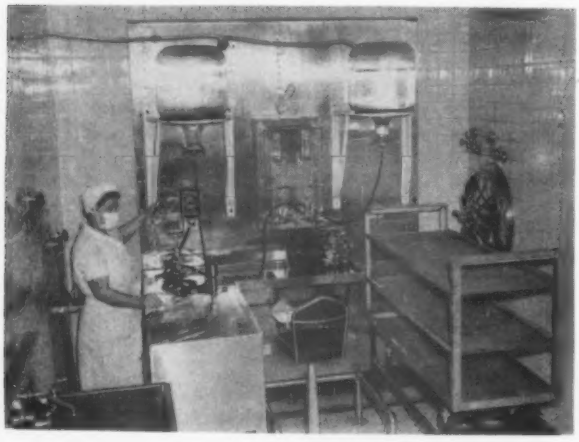


SERUM TYPE STERILIZER USED IN THE PARENTERAL SOLUTIONS UNIT
ST. JOSEPH HOSPITAL, MEMPHIS

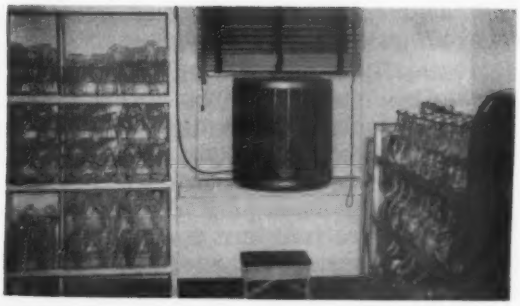
WORK BENCH

Some type of a work bench is necessary for preparing solutions. Ours has gone through an interesting metamorphosis. In 1942 we had the original Fenwal work unit consisting of an oak cabinet and a composition back-board for anchoring one storage tank and the burette unit. It was pretty, but impractical.

First of all, it obliged the technician to stand while working, and intelligent people prefer not to stand for hours unless this is necessary. Secondly, there is bound to be some splattering of water and dripping from the burette spigot; and the small sink was not in the right space to drain this properly. We therefore had to make periodic stops to mop off the surface of our cabinet. In 1944 we found a discarded stainless steel coffee-making table and four-foot draining sink in the attic, which we had our engineer convert into a combination work bench and "splash board." The oak cabinet received a new top and was put into service in the prescription room. At this time we added another storage tank to facilitate a division of the distilled water supply. We also secured a rotating stool and foot-rail so the technician could sit while working. We studied this arrangement while making solutions ourselves, and finally decided upon improvements. Early this year we were able to obtain some stainless steel sheeting and a contractor willing to undertake the job. The result is the all stainless steel unit pictured here. The chief advantages are plenty of drainboard space, a cabinet for costly burettes, recession of the concentrate bottle, a closed cabinet for packaged chemicals; and above all, the possibility for greater cleanliness. The total cost of this work unit was $312.42.



PARENTERAL SOLUTIONS UNIT AT ST. JOSEPH HOSPITAL, MEMPHIS



SECTION OF THE HOT ROOM OF THE PARENTERAL SOLUTIONS UNIT

A STOVE of some type will be needed in the unit to aid in dissolving chemicals. Practically any type of small stove or hot plate is sufficient and the cost will depend entirely upon what is selected.

A THREE-COMPARTMENT SINK in a parenteral manufacturing unit is a "must" for the proper cleaning of flasks and other glassware. Stainless steel is the preferred material for the sink because it is easily cleaned and minimizes breakage. If there is no automatic washer in the unit the center compartment should be filled with the detergent, while the other two are used for tap water. The flasks are placed in first tap, then detergent, then running tap water, and lastly distilled water. Our stainless steel, three-compartment sink cost $220.00.

BOTTLE WASHER

A bottle washer is not essential; but it is a labor saving device and is certainly indicated where many flasks are cleaned daily. The one we have is capable of producing four chemically-clean flasks per minute. It cost $695.00.

FLASKS

Suitable flasks must also be considered as fundamental equipment. The Erlenmeyer and Florence flasks are still being used in some hospitals. These have several disadvantages:

1. They are easily broken.
2. They have no air-tight closures.
3. They cannot be hermetically sealed.

The Fenwal flask is the only one I have been able to find which is made for sale to hospitals only for the production of parenteral solutions. It answers the objections just mentioned. It is constructed of thick pyrex glass and has a combination rubber bushing and stainless steel top which produces an air-tight closure. During sterilization, the top is lightly inserted to allow for an escape of steam from the flask; but is pushed in tightly when the flask is removed from the sterilizer; furthermore, as the boiling liquid cools, its volume contracts. These two forces combine to create a vacuum in the flask which has been found to be very near perfect vacuum.

Dr. Carl W. Walter, who has done much of the pioneer research work in the preparation of intravenous fluids, has stated that only three things are necessary to produce safe parenterals which may be stored indefinitely:

1. A source of fresh distillate of unquestionable purity (a good water still and purity meter.)
2. A method of rendering them sterile (sterilizers).
3. A method of sealing the solutions hermetically (Fenwal flasks).

The one-liter Fenwal flask costs $1.22 each, while the half liter costs $1.08. Rubber bushings cost 30 cents, while the steel tops cost $1.65. These prices seem high; however, we have an average mortality with the flasks of about two a month; the rubber bushing withstands 2000 hours of sterilization; and the steel tops do not show wear even after five years of use. The Upjohn flask also has many merits. Alert pharmacists may be able to obtain these without cost from hospitals which use them but which do not have a parenteral program of their own.

Some method of filtration is necessary to clarify solutions. Cotton and filter paper are not suitable because their washings contain lint. We use fritted glass filters which may be obtained at prices ranging between $7.50 and $12.50 depending upon size.

SECONDARY EQUIPMENT

The equipment mentioned thus far is indispensable whether the volume of solutions is large or small. Whether we invest in any of the following equipment depends upon:

1. The scope of our parenteral program
2. The method of preparation we select
3. The size of the institution

We must decide, for example, if we are to prepare just our intravenous infusions or if we shall also branch out into the preparation of ampuls. Shall we prepare donor and plasma flasks for the blood bank? The size of our institution will reflect our manufacturing volume; and this will dictate the size and convenience of the apparatus we select. Then, too, some of us may be convinced that the Fenwal system is adequate for our purposes; while others may prefer an adsorptive filtration process. The Fenwal system consists of the preparation of a concentrated solution of the chemicals in freshly-prepared distilled water, which is then passed through a fritted glass filter into a semi-closed automatic system by means of suction. The concentrate is then forced into burettes by means of a pressure pump while distilled water is filled by gravity into companion burettes. With each quarter turn of a centrally-located valve, one pair of burettes empty into a flask while the other pair is filling. A flask may thus be filled (volumetrically) every 30 seconds.

Bacterial Filtration: In the adsorptive filtration process, the entire volume of the finished solution is prepared; and this bulk is passed through special pyrogen and bacterial-retentive filters into flasks which are then sterilized. The theory behind this process is that even though the distillate is pyrogen-free, the chemicals we are using may not be. These special filters adsorb pyrogens from whatever source they may arise. Such retentive filters cost approximately $1000.

While adsorptive filtration may have some uses, it also has some disadvantages. First of all, it is cumbersome to handle so large a bulk of solution. On one day last week, for example, we prepared 300 liters of solution. This is approximately 75 gallons and would be a considerable bulk to handle. Secondly, there is a saturation point for adsorptive filters beyond which they are not efficient, and this point is not readily detected. It is extremely important, however, that we select our chemicals carefully and from manufacturers of highest repute. Furthermore, certain chemicals cannot be autoclaved and consequently, the usual means of obtaining the hermetic seal is absent. For such solutions, ultrafiltration seems indicated. Bacterial filters are also needed in the preparation of certain ampul medications which are harmed by sterilization temperatures.

AMPULE WASHERS are available commercially. These are usually too high-priced for ordinary hospital use; therefore we are obliged in this, as in many other instances, to use our ingenuity. The hospital engineer is a good friend to have--often his mechanical knowledge plus the pharmacist's technical ability can bring forth money-saving devices.

There are many more incidental pieces of equipment which can facilitate the manufacture of parenteral liquids. When commencing this work, it is a good policy to select each piece with care and foresight and add a new piece from time to time as the need for it is demonstrated. Thus the initial outlay will not seem too great, and one thus develops a greater appreciation for the contribution of each piece of equipment to the completed unit.

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2. Ibid, Surg., Gynec., and Obstet., 56, 956, 1933.
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4. Ibid, Annals of Surgery, 112, 603, 1940.

Narcotics in Sterile Solutions

A method of preparing and dispensing narcotics which saves the time of nurses and avoids the waste of narcotic drugs

by Sister Henrietta, R.N.

More than ten years ago, the chief pharmacist of this hospital began to prepare narcotics in sterile solutions for use in the operating rooms, and in the emergency and obstetric departments. His aim was twofold: to save time for nurses, especially in emergencies, and to prevent waste of narcotic drugs. About 1940, this method of dispensing narcotics was introduced generally throughout the hospital and it is now so well established that it is completely routinized and accepted. A few other medications now also are being prepared in sterile solution ready for immediate administration by hypodermic.

Emphasizing the time-saving factor in having sterile narcotic solutions dispensed by the pharmacy, hospital magazines and the *Bulletin of the American Society of Hospital Pharmacists* have recently given considerable space to the discussion of this procedure. However, as far back as 1940, the *American Journal of Nursing* carried an article by Thelma Dodds, Lucile Petry, and Charles A. Koepke[1] describing a simplified technic used at the Charles T. Miller Hospital, Minneapolis, Minnesota, and reporting on a time study, tests to ensure sterility, and comparison of costs of this method against that of issuing tablets.

It is planned here to discuss briefly the types of medications put up in sterile solutions, the method of preparing solutions in the pharmacy, how drugs are dispensed to the wards, technic of administration of hypodermics, method of checking on narcotics, and advantages of this method of dispensing medications.

Types of Medications in Sterile Solutions

At Charity Hospital the pharmacy prepares the following medications in sterile solutions: morphine sulfate, codeine phosphate, pantopon, phenobarbital, procaine, and thiamine.

[1] Simplifying Hypodermic Injections, Vol. 40 (Dec.) 1940, pp. 1345–1354.

Sister Henrietta (Charity, New Orleans; B.S., Louisiana State; M.S., Catholic University) is director of the School of Nursing and Nursing Service, Charity Hospital of Louisiana, New Orleans.

Some pharmacists report solutions of atropine, scopolamine, dihydromorphinone, dilaudid, as well as combinations of morphine and scopolomine, and morphine and atropine.

How Solutions Are Prepared in the Pharmacy

Formulae and methods of preparation are presented here for two of the most commonly used narcotic solutions, morphine sulfate and codeine phosphate. Formulae and methods of preparing solutions were supplied by Mr. A. P. Lauve, chief pharmacist at this hospital when this system was first introduced. He is now pharmacist at Mercy Hospital, New Orleans.

Morphine sulfate solution

Morphine sulfate..... 1024 grains
Chlorobutanol..... 288 grains
Distilled water, a sufficient quantity, to make..... 128 fluidounces

Dissolve the morphine sulfate and the chlorobutanol in sufficient pyrogen-free distilled water to make the product measure 128 fluidounces. Filter the solution through a previously washed hard filter paper, such as Whatmann's No. 50, and dispense in 1 fluidounce rubber-capped vials. Sterilize according to process "D" of the *National Formulary.*

The finished product will contain morphine sulfate in the following dosages: ¼ gr. in each 15 minims or ⅙ gr. in each 10 minims.

Codeine phosphate solution

Codeine phosphate..... 512 grains
Chlorobutanol..... 72 grains
Distilled water, a sufficient quantity, to make..... 32 fluidounces

Dissolve the codeine phosphate and the chlorobutanol in sufficient pyrogen-free distilled water to make the product measure 32 fluidounces. Filter the solution through a previously washed hard filter paper, such as Whatmann's No. 50, and dispense in 1 fluidounce rubber capped vials. Sterilize according to process "D" of the *National Formulary.*

The finished product will contain codeine phosphate, ½ gr. in each 15 minims.

One ounce prescription Duraglass bottles are used for issuance of the narcotic solutions. Bottles are treated with concentrated hydrochloric acid, one part to nine parts of water, prior to the final rinsing with distilled water before filling with the solution.

The bottles are fitted with sleeve rubber stoppers. These are regular serum stoppers with skirts, from which soapstone has been removed in the pharmacy.

It is interesting to note that some pharmacists are using old penicillin vials. These are economical, and stoppers to fit them may now be purchased.

Some institutions add dyes to the solutions for prevention of errors; for example, a blue dye is added to the codeine phosphate solution, yellow to the morphine solution. However, Mr. Lauve believes that labels of different colors achieve the same purpose and are safer because clear solutions permit more ready detection of changes than do colored.

How Drugs Are Dispensed to the Wards

Narcotic solutions are dispensed on requisition written by the head nurse and approved by the supervisor. The requisition must be accompanied by an empty container and the record of narcotics previously administered from the container. Each nursing unit is allowed to keep on hand only two containers of narcotic in any one strength. A third order will not be honored. With the new container is issued a new record form which has a number corresponding to the serial number on the label of the bottle of narcotic solution. A record of this number is kept by the pharmacy.

Narcotic solutions are dispensed as follows:

On adult wards:

Morphine sulfate solution..... 1 oz.
m. 10 = ⅙ gr. } Both dosages appear
m. 15 = ¼ gr. } on label
Codeine phosphate solution..... 1 oz.
m. 15 = ½ gr.
Pantopon solution..... ½ oz.
m. 15 = ⅓ gr.

On pediatric wards:

Morphine sulfate solution..... 1 oz.
m. 10 = 1/12 gr.

To ensure correct dosage for infants and older children on the pediatric floor, the pharmacy prepared the following scale which is kept in each narcotic station:

Morphine sulfate solution
From m. 10 = 1/12 gr.
m. 1 = 1/120 gr.
m. 2 = 1/60 gr.
m. 3 = 1/40 gr.
m. 4 = 1/30 gr.
m. 5 = 1/24 gr.
m. 6 = 1/20 gr.
m. 8 = 1/15 gr.
m. 10 = 1/12 gr.

The doctors on our pediatric services have also adopted a scale of accepted dosages of narcotics for infants and children, dependent on ages.

Other medications are dispensed in sterile solutions as follows:

Phenobarbital sodium solution.....1 oz.
m. 10 = gr. ii
Procaine solution...2 oz. ea., 1%, 2%, or 4%
Procaine solution..6 oz. ea., ½%, 1%, or 2%
Thiamine hydrochloride.....10 cc. vial,
30 mg. per cc.

Technic of Administering Hypodermics

To prepare and administer medications in sterile solution the following equipment is needed:

Tray containing:
Glass-covered container for syringes.
Two or three hypodermic syringes. Small glass-covered container for sterile needles.
One needle for each syringe (at least).
One glass covered container with cotton pledgets in stainless tr. zephiran chloride, 1–1000.
Forceps in jar of sterilizing solution of zephiran chloride, 1–1000, containing 1 per cent sodium nitrite.
Bakelite tray 3″ x 5″ for carrying hypodermic.
Drug as ordered.

The procedure for preparing and administering the hypodermic of sterile solution is as follows:

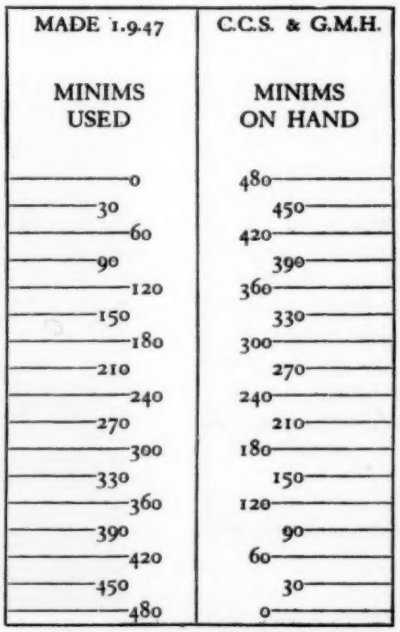
1. Read the order carefully; note when the drug was last given to see that the interval between doses is correct.
2. Check the patient's respiration if the drug to be given is any form of opium.
3. Obtain narcotic key and go to treatment room.
4. Using sterile forceps, place three cotton pledgets on hypodermic tray, then remove sterile syringe from container. Fit plunger into barrel and attach needle by twisting it on to tip of syringe. Place needle on one of the cotton balls and take to narcotic box in nurses' station.
5. Obtain bottle of solution and read label carefully.
6. Clean rubber stopper with second cotton pledget and discard pledget; read label.
7. Draw air into syringe equal to dosage. Plunge sterile needle attached to syringe through rubber, expel air, and withdraw required amount of solution. Place needle on first cotton pledget.
8. Read label, place bottle in box, lock compartment. Check order and take hypodermic to bedside. Ask patient's name and explain procedure.
9. Cleanse area about site of injection with cotton pledget and discard; expel air from syringe by holding it with needle pointed upward. Take a firm grasp of tissue on outer side of arm or extremity to be used. Insert needle quickly at a 45° angle, withdraw it slightly, then place thumb on plunger and inject drug, slowly releasing grasp as drug is injected. Withdraw needle quickly, and massage gently with third pledget.
10. Chart the medication on the nurses' notes and enter it on the narcotic record form issued by the pharmacy with the container.

Method of Checking on Narcotics

Narcotic stations have been established in certain wards or departments throughout the hospital and a file of these stations is kept in the pharmacy. A narcotic station is a compartment built into the medicine cabinet of a ward. One nurse assigned to each unit holds the key to the station. Routine narcotics are dispensed only to the designated stations.

The central service unit on each floor (a dispensing unit for medical and surgical supplies) is held responsible for keeping a record of the narcotics requisitioned and dispensed to the stations on its floor. Narcotics are accepted from the pharmacy by the central service nurse, who enters the amount and kind in a narcotic book. They are then delivered to the floor stations where the nurse holding the key to the narcotic station is required to sign for them. From time to time, central service makes a physical inventory of the narcotics on hand in each station, at which time bottles are examined and any solutions showing deterioration are returned to the pharmacy.

As mentioned before, the pharmacy issues a narcotic record form with every bottle of narcotic solution. Forms for all narcotics on hand are kept in a binder in the narcotic station, and each dose of narcotic is recorded on the proper form.



This scale is graduated to fit 1-ounce bottle

For current checking of the narcotics administered against the amount of narcotic solution on hand, a simple scale has been devised. This is made of cardboard, ruled with ink, and covered with X-ray film. By calculation of the doses given in minims, and subtraction of this total from the amount in the bottle when dispensed from the pharmacy, the nurse can estimate how much should remain in the bottle. A check of the actual amount present in the bottle would be impossible, however, without the scale shown here, because bottles are not graduated.

When the narcotic is all used the record form must tally with the quantity of solution supplied in the original order. Recognizing the inevitable loss of small quantities of solution through frequent withdrawals from the bottle, each narcotic station is allowed a loss of not more than 30 minims to an ounce of solution; for example, nurses must account for 450 out of 480 minims of a morphine sulfate solution. If the record cannot be made to balance with the quantity supplied, full explanation must be made by the supervisory staff.

Narcotics are kept under perpetual inventory in the pharmacy, and the physical inventory made by central service is reported to the pharmacist in charge of narcotic control for comparison with her records.

Experience has proven that solutions of morphine, codeine, and pantopon may be kept indefinitely. Phenobarbital solution precipitates rapidly and must be renewed about every forty-eight to seventy-two hours. Nurses are instructed to return to the pharmacy any solutions that become discolored.

Advantages of Preparing Medications in Sterile Solutions

Viewed from the vantage point of experience, there appear to be three main advantages to this method, namely the time saved in preparing medications for administration, greater assurance of sterility, and money saved.

The amount of time saved by this procedure varies with the technic used prior to the adoption of sterile solutions. The experiment at the Charles T. Miller Hospital showed the saving in nurse's time by substitution of the multiple-preparation for the single-preparation method to be 83 per cent. This institution changed from the old alcohol-spoon method to the narcotic solution technic. In some hospitals where a bottle of sterile water for dissolving tablets is provided on hypodermic

trays, the time saved would not be so great, but the second advantage, greater assurance of sterility, still makes this method more desirable.

While no actual survey has been carried on, nurses with many years of experience in the use of sterile narcotic solutions at Charity Hospital state that they have seen no hypodermic abscesses following the administration of these solutions. This is attributable to the presence of chlorobutonol, a bacteriostatic agent which keeps the solution sterile.

It is estimated that a saving of about 50 per cent can be effected by the pharmacy in the solution method over the tablet method for hypodermics. This figure is given in the report on the Minnesota experiment and is substantiated by our experience.

When mutual co-operation is the goal of pharmacy and nursing department, dispensing of sterile solutions for hypodermic use and maintenance of necessary records for narcotic control can be jointly worked out to the ultimate good of all concerned. We are grateful to our pharmacists, past and present, for their vision and fine spirit of teamwork in this particular procedure.

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THE NEED OF A GRADUATED VIAL FOR DISPENSING NARCOTIC SOLUTIONS

The realization of a need for a graduated vial has been universal wherever the narcotic drugs have been presented for use in sterile solution form. This factor is closely associated with the requirements of the Harrison Act of which a major element is accountability for supplies of any drug embraced by the provisions of the Act.

A very real contribution hospital pharmacy has made toward efficient hospital operation has been the adaptation of this form of solution to the narcotic administration problem. Chief objections proffered by hospital pharmacists have dealt largely with the difficulty of accounting for a quantity of narcotic drug once it has been placed in solution and advanced to a nursing unit for general use. This has been contrasted with the ease of accounting for hypodermic tablets of the same drugs.

The Narcotic Division of the Treasury Department has not simplified this problem by insisting upon exceedingly narrow limits of permissable loss incident to the use of a multiple-dose unit. It is to be hoped that a more practical interpretation will be developed at the Institute on Hospital Pharmacy this summer.

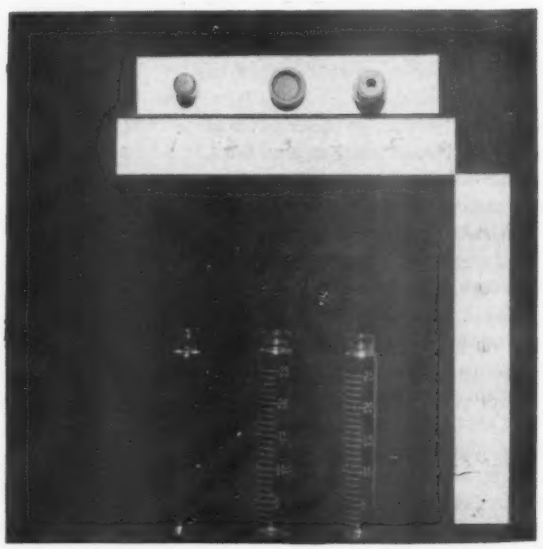
Viewed from the broad perspective of overall hospital operation, it appears too much import has been attached to accountability, per se, and too little attention given the natural feasibility and practicality of the use of sterile solutions of these drugs. To overcome the problem of accountability some efforts have been made to provide graduated vials.

AN ACCURATELY GRADUATED VIAL

Another hospital pharmacist has suggested a vial such as that illustrated in the accompanying illustration. This vial possesses a number of disadvantages but does present accurate graduations which provide facilities for precise measurement of the volume of solution remaining in a vial. It is unquestionably a desirable feature to provide accurate and easily counted graduations so that losses due to withdrawal exigencies may be observed and noted as they occur. The vial illustrated could be made available with varying types of rubber caps depending entirely upon that which represented the most useful and desirable. A seal for the cap may be adopted from at least three possibilities.

1) The gelatin seal advocated by the University of Michigan Hospital Pharmacy; 2) Adaptation of 'Celloseal' (Du Pont); 3) If the mechanical equipment be available, the aluminum seal sold by Alcoa.

This illustration merely represents a suggestion and is not commercially available. The intent has been to find one design which, in the interests of economy and universally accepted features, could be employed in all hospitals where sterile narcotic



solutions might be provided and, as a result of universal acceptance, possess the greatest utility. The design illustrated is graduated and numbered in 0.5 cc. intervals, thus at the 2.5 cc. mark occurs the number 5, etc. This feature is not good and it is generally agreed, should be eliminated to the extent that graduations be numbered at 1 cc. intervals (say, 5 cc. and 10 cc.). Any comments which would further aid in the development of a standard unit of this type with the inherent feature of accuracy in graduation would be appreciated and may be relayed to the pharmacists working along these lines through the editor of THE BULLETIN.

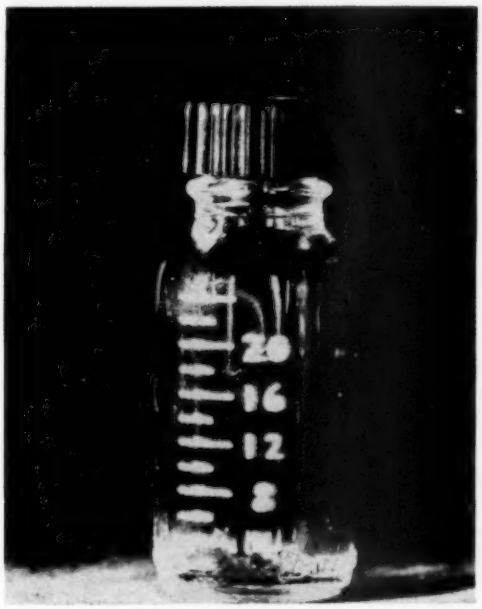
A GRADUATED VIAL DEVELOPED BY THE HOSPITAL FOR JOINT DISEASES OF NEW YORK

by Max R. Huttner
Chief Pharmacist

The present stage of development is the product of several attempts to achieve, simply, graduations on vials used for sterile solutions of the narcotic drugs used by the Nursing Service of this hospital. Labels bearing approximate graduations were employed at one stage with limited success. This was followed by the use of decalcomania. Both approaches entailed too great an expenditure of personnel time in the Department of Pharmacy to compensate for the limited utility of graduation of vials in this approximate fashion.

The current method continues to provide approximately accurate graduation but achieves this state economically. The advantages of this approach to the problem of accountability are, in essence, that the Nursing Service may check with a reasonable degree of accuracy their recorded use as compared with the volume of solution remaining in a vial. It must be recognized that an accurately filled vial loses accuracy of volume upon the occasion of the first withdrawal due to solution lost by adjusting a syringe, that solution remaining in the needle, etc. Hence, little would be gained over the procedure developed here were graduations of analytical precision to be employed.

The accompanying illustration presents the units of the vial assembly employed for these solutions. The glass vial is a regular 30 cc. 'Boston Round,' screw-cap, clear glass prescription bottle. These bottles are graduated by sand blasting at approximately 2 cc. intervals up to 24 cc. Numbers occur at 4 cc., 8 cc., 12 cc., 16 cc. and 20 cc. intervals. A rubber stopper fits snugly into the opening of the bottle. The stopper presents a surface for needle puncture. A narrow shoulder on the stopper extends over the lip of the bottle but there is no sleeve arrangement to slide down over the external part of the top of the bottle. Instead,



a plastic screw cap tightens over the rubber cap holding it securely in place during processing and in use. This is achieved largely by the narrow rubber shoulder described above. The plastic screw cap is constructed with an opening in the top permitting needle puncture of the rubber stopper without removal of screw cap.

It is this writer's understanding that Sister Mary John of Mercy Hospital, Toledo, Ohio, has information on a similar type of graduated container which has been developed for use for this purpose at her hospital.

Bottles: John M. Maris, 52 Walker Street, New York 13, N. Y.
Rubber Stoppers: National Surgical Supply Co. Stopper #136, 458 Broadway, New York 13, N.Y.
Screw Cap: Mason Drug Company, 22 Thayer Street, Boston 18, Mass.
Sand-blasting: Coply Appliance Company, 99 West 4th Street, South Boston, Mass.

Total cost (current prices) of assembled unit, slightly less than $0.14 each.

Therapeutic Trends

New Trends in Medicine and Pharmacy Include - VITAMIN B_{12} ISOLATED - TETRA-ETHYLPYROPHOSPHATE IN MYASTHENIA GRAVIS - VITAMIN E IN VASCULAR DISEASE - SODIUM SUCCINATE IN BARBITURATE DEPRESSION - NEW DIURETIC: FORMOQUANAMINE

VITAMIN B_{12} ISOLATED

Isolation of the anti-pernicious-anemia factor from liver has been announced in Science (April 16, 1948) by scientists working at Merck and Company. Identified as a member of the vitamin B complex family, this antianemic factor has been named vitamin B_{12} pending further chemical identification of its molecular structure. Comparing this factor with the parenteral commercial liver extracts it was found that only 0.001 to 0.014 per cent of the dry weight of the extracts consisted of B_{12}. Since ten to fifteen grams of liver are required to produce the amount of extract suitable for a single day's dose, it may be calculated that the anti-pernicious-anemia activity in this amount of liver is concentrated at least a million times in the new crystalline vitamin. If it is assumed that this anti-pernicious-anemia factor is the only substance present in these liver extract preparations which is therapeutically active, it is evident that clinical response should be obtained from the parenteral administration of approximately 1 microgram of vitamin B_{12} per day.

By using this factor in the treatment of pernicious anemia the physician can administer known doses of the pure vitamin insuring exact therapeutic results. To date observations on human subjects show that it restores normal blood conditions using much smaller amounts than is required of either the unpurified liver extract or folic acid to produce comparable effects. This preliminary report further indicates that by using a sufficiently large dose it may be possible to produce prolonged remission in pernicious anemia and thus avoid the expense of the more frequent injections as required when using parenteral liver extract. Vitamin B_{12} may also control the other manifestations of the disease such as nerve degeneration.

Further reserach on the composition, structure and biological activity of vitamin B_{12} will be carried out to determine its therapeutic value.

TETRA-ETHYLPYROPHOSPHATE IN MYASTHENIA GRAVIS

Tetra-ethylpyrophosphate (T.E.P.P.) has been found to be a powerful anticholinesterase, its actions closely resembling those of eserine and prostigmin. In a preliminary study reported in Lancet (April 3, 1948), tetra-ethylpyrophosphate was used to treat patients with myasthenia gravis and tests for muscular power made. The authors concluded after the actions of tetra-ethylpyrophosphate were studied in three patients with myasthenia gravis that this drug is a completely effective substitute for prostigmin.

Tetra-ethylpyrophosphate may be administered either by injection or orally. For intramuscular injection a 0.5 per cent solution in propylene glycol was used. For administration by mouth a 2 per cent or 5 per cent solution in propylene glycol was made; a calibrated dropper was then used to measure the correct dose into 1 to 2 fluid ounces of water, which was swallowed immediately. Once the solution is mixed with water it must be administered immediately owing to the rapid inactivation of T.E.P.P. in the presence of water. Orally, 10 mg. of T.E.P.P. is equivalent to 100-150 mg. of prostigmin given by mouth. The maintenance dose of T.E.P.P. has ranged from 8 to 12 mg. daily, given in two or three doses by mouth. Visceral side-effects of tetraethylpyrophosphate may be controlled by atropine. When central side actions developed with T.E.P.P., muscular power was well maintained for the next 24-36 hours without further dosage.

In single doses, by injection, T.E.P.P. is from a third to a half as potent as prostigmin, but its action lasts about twice as long. It is more cumulative than prostigmin, but less so than di-isopropylfluorophosphonate (D.F.P.). Owing to its cumulative effect the action of tetraethylpyrophosphate is much more even than that of prostigmin.

VITAMIN E IN VASCULAR DISEASE

The effect of tocopherols upon pathological conditions of the vascular system seems to indicate favorable results according to a report in The Journal of Surgery, Gynecology and Obstetrics (January 1948). When tocopherols were administered to arteriosclerotic cardiacs it was noted that feet and hands which had been cold and numb for years had suddenly become warm again. Also small indolent ulcers seemed to heal rapidly. As a result of these effects tocopherol therapy was used in a series of patients having vascular diseases. Among the conditions studied were thrombophlebitis and phlebothrombosis, indolent ulcers of the leg, early gangrene of the extremities, thromboangiitis and related vascular conditions, and cerebral thrombosis.

In the clinical work alpha tocopherol was administered orally in dosages of about 200-300 milligrams daily. The need for continued treatment at high dosage levels is emphasized. Parenteral tocopherols were used in cases of acute cerebral thrombosis but patients treated in this manner seem to react in one-half to one-third of the usual time taken when the drug was administered by mouth. As a precaution it is pointed out that inorganic iron should not be given with the tocopherols since the latter are destroyed by ferric salts.

Results obtained following tocopherol therapy seemed in some cases to be analogous that obtained after sympathetic block. From the observations made, it is concluded that tocopherol therapy may be helpful wherever improved arteriolar circulation or better oxygen utilization in tissues is desired.

SODIUM SUCCINATE IN BARBITURATE DEPRESSION

Experimental studies on animals indicate that sodium succinate is valuable as an analeptic in barbiturate depression. This preliminary report was made in Current Researches in Analgesia and Anesthesia (March-April and May-June, 1947). Further studies on man to observe the effect of sodium succinate on barbiturate depression showed that it is a safer and more effective therapeutic agent than convulsant drugs.

A solution of sodium succinate was given intravenously to a series of 70 patients following pentothal sodium anesthesia. The dose administered was determined by the depth of depression. If indicated, doses up to 30 grams, and possibly more, of the hydrated salt of sodium succinate may be given without detriment over a fifteen minute period, to adult humans in barbiturate depression. Sixty grams and probably more may be given over a two hour period. Since sodium succinate is apparently metabolized or destroyed very rapidly in the human body, in cases of barbiturate poisoning it is recommended that a concentrated (30 per cent) solution of the salt should be used for the initial dose, in a sufficiently large quantity to assure recovery. A weak (10 per cent) solution may be used if the more concentrated solution seems neither necessary or desirable.

A preparation of sodium succinate for experimental use is available from Brewer and Company, Worchester, Massachusetts.

NEW DIURETIC - FORMOGUANAMINE

Formoguanamine is a diuretic which appears to be more potent than urea. According to an experimental study reported in The Journal of Pharmacology and Experimental Therapeutics (February 1948), this diuretic is 347 times as active as urea in the rat and 145 times in the dog.

During the early experiments on dogs diuretic doses of 15 mg./kg. of formaquanamine were fed to a group of six dogs 72 times each, and 24 doses of 20 mg./kg. to a group of six rabbits without producing toxic effects. After the diuretic activity of formoguanamine on rats, rabbits, and dogs was established and no untoward side action was apparent in acute or chronic experiments, the drug was tested on normal human subjects. Likewise in the experiments on human subjects, formoguanamine produced a significant diuresis and chloruresis in normal fasting persons in doses between 4 and 9 mg./kg. Humans were administered 350 ml. of 0.85 per cent sodium chloride solution along with the diuretic and it was found that 8 to 9 mg./kg. of formoguanamine removed 90 to 100 per cent of the introduced fluid in four hours.

In conclusion the authors state the formoguanamine proved to be more consistent in diuretic activity than the xanthine diuretics under comparable conditions.

pharmacy and public health

EDITED BY
HERBERT L. FLACK, CHIEF PHARMACIST
JEFFERSON MEDICAL COLLEGE HOSPITAL, PHILADELPHIA

CANCER CONTROL WEEK

The week of April 18, and in fact the whole month of April was set aside to focus attention on the current drive for funds to further cancer research. Every week should be cancer control week and the pharmacist might well continue to disseminate information about cancer control. In this behalf, it was thought apropos to present a summary of the latest advances in cancer control and diagnosis.

METOPON HYDROCHLORIDE is available for the relief of cancer pain only, and though commercially available, is still in the investigational stage. A tremendous fund of information is becoming accumulated on the value of this drug in relieving cancer pain. It is more effective than morphine by oral administration, shows less tolerance and addiction, and yields fewer side reactions of nausea and dullness.

TEROPTERIN, chemically pteroyl trigulatamic acid, can be injected intravenously or intramuscularly and probably blocks metabolism of cancer cells so that the rapid growth is prevented, and sometimes even the cell is killed. It provides palliative relief for cancer patients.

MASS DETECTION OF CANCER may soon be as easy as the use of X-ray in detecting tuberculosis. The test is made by placing a small amount of the person's blood plasma in a glass tube, diluting it with distilled water and taking a reading of the light transmitted through the plasma with a photoelectric colorimeter. The tube of diluted plasma is then put in vigorously boiling water for ten seconds and a second light transmission reading is made. The heat coagulates the plasma and the difference between heated and unheated plasma is measured in terms of heat coagulation. Blood plasma from cancer patients coagulates much faster when heated than blood plasma from healthy persons or from persons sick with diseases other than cancer. The coagulation measure, it is believed, can therefore be used to detect the presence of cancer.

RADIOACTIVE MATERIALS have many uses in cancer control. Cancer of the thyroid cells, a type of hyperthyroidism, can be treated with use of radioactive iodine given parenterally. Radioactive phosphorus has been used to treat cancer of the skin, in which the skin area is covered with a blotter soaked in the P^{32} preparation. The blotter is covered with gauze and tape for a period of three to four days. On uncovering, the lesion has been obliterated and healthy tissue is found in its place. Radioactive gold can be injected intravenously, is non-toxic and inert.

It is of value in carrying radiation throughout the body. In an area of cancerous tissue, the Geiger counter will show a greater concentration of radiation than in other parts of the body, thus helping to detect and delineate the cancerous area. Radioactive cobalt is likely to become a cheap but effective, and a safe substitute for radium therapy. This substance is now receiving extensive clinical trial by use in needles or tubes and by insertion similar to that of radium therapy of cancerous tissue. Cost of an equivalent amount of radioactive cobalt is one-seventh that of radium, is safer to use and transport, and will be readily available to all who need such substances in cancer therapy. The half-life of radioactive cobalt is 5.3 years.

AMINOPTERIN, a folic acid antagonist, has been found in animals to block the activity of estrogenic hormone in stimulating cancerous growth. The effect of hormones on cancer of the breast and of the prostate has been extensively studied. Testosterone propionate has been prescribed for mammary cancer with the thought that it will antagonize or reduce the secretion of estrogen in the female, which excessive secretion is suspected of

being a cause for or of stimulating mammary cancer. Often the patient's ovaries have been removed or destroyed by radiation in the hope of stopping the estrogen-stimulating effect on the cancer. The use of Aminopterin in interfering with estrogen activity shows possibility of change in therapy, since it will also inactivate estrogen released from sources other than the ovaries.

WORLD HEALTH ORGANIZATION

WHO, as the World Health Organization is popularly abbreviated, offers many advantages to the United States through membership therein. The U.S. is the only major power not holding membership, this fault being caused by some indeterminate group in Congress which has caused tabling of the bills to provide funds and authorization for joining WHO. The World Health Organization is an outgrowth of the old League of Nations, and operated during World War II even to the extent that the Axis countries supplied information on vital statistics and other information of use to this organization, this information being released through neutral countries. All health organizations in the USA have endorsed membership in WHO as a means of insuring better and more economical health measures for U.S. citizens, since WHO will be able to plot out major epidemics and will be able to attempt world-wide control of serious menaces to health, such as malaria, smallpox, plague, cholera, etc. Even Russia has joined and was the 24th nation to join.

NATIONAL SCIENCE FOUNDATION

After being vetoed once by the President, new bills have been introduced into Congress for establishment of an executive branch in the Government--a Foundation composed of 24 members and a director, all appointed by the President. Purpose of this Foundation will be to support research in the fields of mathematical, physical, medical, biological, and engineering sciences by making federal funds available to private and public groups, and by granting fellowships and scholarships to deserving science students. These new bills are expected to meet with unanimous approval and be passed by the President, since the offending parts of the original vetoed bill have been removed. Twenty million dollars has been recommended for use of the Foundation for the first year of its operation.

PREPAID MEDICAL CARE PLANS

When Dr. Paul R. Hawley recently resigned as medical director of the Veterans Administration, he anticipated temporary relief from the stress of administrating a tremendous project. Since his subsequent appointment as chief executive officer of the Blue Cross Commission and Associated Medical Care Plans (Blue Shield), it looks as though he was just leaving one huge task for another. Dr. Hawley sees in this job, "an exceptional opportunity to contribute to the improvement of the medical care of our people. I have seen government medicine in operation in other countries and I know what government control does to medicine. I want no part of it for our people. Government control tends to curb all initiative in medicine and it tends to protect the poorer practitioner and does not encourage the good ones." Thus we have the background for beginning an all-out effort to stave off nationalized or socialized medicine.

Today, some 11 years after origination of Blue Cross plans, there are nearly 30 million subscribers in 85 Blue Cross plans with 10 million additional coverage by commercial policies. In Rhode Island, 65 percent of the entire population of the state is enrolled in Blue Cross. Blue Shield (payments to physician) now has 48 plans in the country with over 7 million subscribers. Delaware leads with 41 percent of its population enrolled.

Under the hospital construction act, evidence must be produced that the operation of a rural hospital can be financed once it is built. One state hospital authority decided this requirement would be automatically met when 75 percent of the population in the hospital area was enrolled in Blue Cross.

SHORTAGE OF PHARMACISTS

In the March-April Bulletin of the National Association of Boards of Pharmacy, is presented interesting statistics on present shortage of pharmacists and future pharmacist replacements from the colleges. At this moment, some three thousand additional registered pharmacists would alleviate the shortage and thus meet the demand for profitable employment of pharmacists. Using an annual replacement factor of 3.5%, as recommended by The Pharmaceutical Survey, and based on 94,641 active pharmacists, some 3324 pharmacist replacements would be required yearly. The total 1948 senior

class will graduate 2332, in 1949 some 4499 students graduate, in 1950 some 6709, and in 1951, 4693 graduates are estimated based on present pharmacy college enrollments. At first glance it would appear as though there will be a definite surplus of pharmacists in a few years. It is easily possible that the increased need for pharmacists in hospitals, and the contemplated expansion of hospital facilities with corresponding additional need for pharmacists, neither of which is reflected in the above statistics, will offset the apparent surplus number of pharmacists that will be graduating these next few years.

PHARMACIST IN 50 BED HOSPITAL

Following was noted in the "Small Hospital Questions" section of MODERN HOSPITAL for April 1948: Question was - "Does the 50 to 100 bed hospital need pharmacy direction and supervision by a registered pharmacist?" The answer given was: "To maintain a modern and efficient hospital pharmacy, at least one registered pharmacist per hundred beds is now acknowledged to be necessary.

The hospital pharmacy has as its chief function the maintenance of a high standard of care for the patient, which can be given only by a licensed pharmacist. The pharmacy has, as well, the responsibility of stocking and then issuing routine and special preparations needed by the departments, such as nursing, surgery, central supply, x-ray, laboratory and housekeeping. Obviously, such a centralization of supplies indicates economy as opposed to scattered and inconsistent buying throughout the departments. Manufacture of pharmaceuticals and the maintenance of an outpatient department are two income drawing services which can be developed by the pharmacist according to the need and especially to the amount of time available.

These principal functions of the hospital pharmacy hold true, for a hospital of any size, large or small, differing only in volume. This regime carried out carefully and efficiently will prove economically sound in a 50 to 100 bed hospital and may still allow time for special services."

* * * * *

Correspondence - continued from page 98.

and the Council on Pharmacy and Chemistry of the American Medical Association. On the basis of this work, the two Councils accepted Metaphen Disinfecting Solution.

In this recent report to which we refer, the investigator showed that if he used thioglycollate broth for testing the treated cultures, he obtained results which paralleled very well his animal tests. The work on Metaphen Disinfecting Solution using thioglycollate broth as the medium for testing the killing of germs was done in 1944. The sodium thioglycollate, being a sulfur compound, neutralizes the mercury on the surface of the germ cell and permits it to grow if it has not been truly killed. In these tests made in 1944, two strains of Staphylococcus aureus were used, two strains of E. coli, two strains of Streptococcus hemolyticus, one strain of Streptococcus viridans, and one strain of Monilia albicans. In this particular test two different lots of Metaphen Disinfecting Solution were used; one was fairly freshly prepared, whereas the other was practically two years old. In every case each of the test organisms was killed in three minutes or less, even when this thioglycollate broth was used to prove that the germs were truly killed.

What we want people to realize is that Tincture Metaphen and Metaphen Disinfecting Solution are still exceedingly dependable products for the purposes for which they are intended. Even the aqueous solutions have certain limited uses. It would be a mistake for one to recommend aqueous Metaphen 1-500 as a preoperative disinfectant for the skin or for killing bacteria on surgical instruments. This aqueous solution is, however, especially valuable for wet packs where it is to remain in contact with the lesion for a prolonged period, and even the 1-2500 aqueous solution is of value in treating infections of Gram-negative bacilli and cocci in the eye. It may be added that aqueous solutions of Metaphen are exceedingly efficacious in the killing of Psuedomonas aeruginosa.

May I add a personal note? Until now I had not seen a copy of THE BULLETIN of the American Society of Hospital Pharmacists. I am very much impressed with the quality of the Journal, both in appearance and in contents, and I have no doubt that it is serving as an exceedingly valuable publication to your members. Someone is doing a unique job in financing a publication of this kind without depending on an advertising revenue. You certainly deserve a great deal of credit, and I offer my congratulations.

EDGAR B. CARTER
Executive Director of Research
ABBOTT LABORATORIES
North Chicago, Illinois

CURRENT LITERATURE

AMERICAN PROFESSIONAL PHARMACIST

March 1948 - "WANTED: Career Hospital Pharmacists." An interesting commentary on the future need of well trained and qualified chief and staff hospital pharmacists. The attempt to fill this need by adequate training through the internship plan leading to a graduate degree is explained. Page 256

April 1948 - "Interesting Facts from the SURVEY OF HOSPITAL PHARMACY." A preliminary detailed report and analysis of the results of the questionnaire on the "Survey of Hospital Pharmacy" conducted by the AMERICAN PROFESSIONAL PHARMACIST. Page 353

HOSPITAL MANAGEMENT

March 1948 - "Plan Pharmacies for Federal Aid Hospitals Over 100 Beds" - A summary of the paper presented by Guy Trimble of the U. S. Public Health Service at the Southeastern Hospital Pharmacy Association meeting at Atlanta, Georgia. Brief comment on the entire program also included. Page 86

April 1948 - "Recent Advances in Drug Therapy in Psychiatry and Neurology" by Henry R. Viets, M.D., Neurologist, Massachusetts General Hospital, Boston, Mass. - An outline of some important changes in the last 5 years in drug therapy of nervous conditions with emphasis on procedures developed in 1946 and 1947. Page 88

HOSPITAL PROGRESS

April 1948 - "The Pharmaceutical Survey" - A paper presented by Mr. J. Solm Mordell at the annual conference of the Maryland-District of Columbia Hospital Association in Baltimore last November. A history of the activities of the Pharmaceutical Survey, inaugurated in 1946. Page 130

MODERN HOSPITAL

March 1948 - "The Clinical Use of Barbiturates" by Leon H. Bloom and Carl C. Pfeiffer, M.D. - Barbiturates are discussed with emphasis on the chemistry of the drugs including the relation of classification and structure on the pharmacological action and uses. Page 104

April 1948 - "Pharmacology of Glutamic Acid" - by C. C. Pfeiffer, M.D. and A. T. Hasegawa. - A report on the clinical use of this drug for its effect on the central nervous system and results of studies on mentally retarded children. Page 80

SOUTHERN HOSPITALS

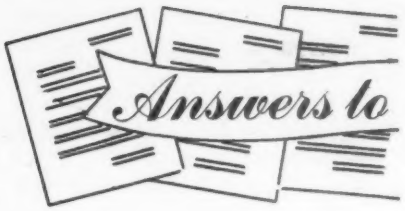
April 1948 - "The Interne's Prescription Problem" by Louis L. Freidman, M.D. - An article suggesting a method of acquainting the new interne with a hospital formulary. Page 73

Reactions to Intravenous Administration of Solutions

Continued from page 113

SUMMARY AND CONCLUSIONS

Pyrogenic reactions from intravenous solutions remain a problem in many hospitals although the means to eliminate them entirely are well known. Immediate sterilization after proper distillation will eliminate pyrogen from solutions, provided that glass containers are similarly sterilized after cleansing and rinsing with distilled water. Periodic cleansing of distilling apparatus is necessary. Immediate sterilization after rinsing with distilled water is necessary to prevent production of pyrogen in moisture films within tubing, needles and glassware. Use of disposable tubing and sets will eliminate reactions due to these factors. Cleansing of tubing just before administration of fluids by wasting 100 cc. or more of the solution and thus rinsing the apparatus will prevent reactions if nondisposable tubing is used, and is always a safety factor if there is doubt of the complete absence of pyrogen in tubing.



QUERIES

EDITED BY EVLYN GRAY SCOTT, CHIEF PHARMACIST,
ST. LUKE'S HOSPITAL, CLEVELAND

STARCH FOR GLOVE POWDER

W. F. of Ohio wants a source of starch suitable for glove powder.

Johnson & Johnson, New Brunswick, New Jersey, is about to make commercially available "Biosorb" which is a form of starch pectinate. This material was developed during the war to replace the use of talc on rubber gloves because of the deleterious effect of the non-absorbent magnesium silicate when left in the abdominal cavity during an operation. Potassium bitartrate was suggested as a replacement for talc but it has not been proved entirely satisfactory.

SACCHARIN TEST FOR CIRCULATION TIME

G. S. of New Jersey asks for information on Saccharin solutions for circulation time.

The saccharin test for circulation time along with other tests that depend upon patient cooperation are of questionable value, because of the inability to duplicate the results. A discussion of the clinical application of the circulation tests, including saccharin along with some of the newer tests will be found in the book "Heart Disease" by Paul Dudley White, M.D. -- Page 237 - 3rd edition, 1944, published by The Macmillan Co., New York. One of the references is "Clinical Significance of Blood Circulation Time as Determined by Saccharin Test," Med. Ann. Dist. of Columbia, 1936, V. 238.

PROTEOLYSED LIVER FOR ORAL USE

A. L. of Ohio wants to know a source of Proteolysed Liver for oral use.

Proteolysed Liver may be obtained from Allen & Hanbury's, Ltd., London, E2. The 16 oz. jars cost twenty-one shillings. It is advertized as palatable and effective for the oral treatment of Megalocytic Anaemias.

INDELIBLE MARKING INK

W. S. of Ohio requests a formula for indelible laundry ink.

On page 403 of "The Pharmaceutical Recipe Book," the following formula is given for:

INDELIBLE MARKING INK

Silver Nitrate	310 Gm.
Acacia, in fine powder	186 Gm.
Lampblack	23 Gm.
Stronger Ammonia Water, a sufficient quantity,	
To make	1000 cc.

Dissolve the acacia in 475 cc. of stronger ammonia water by frequent agitation. Add this to the solution of silver nitrate in 250 cc. of stronger ammonia water. Triturate the lampblack with this mixture, added gradually, and add sufficient stronger ammonia water to make the product measure 1000 cc.

This ink should be used with a quill pen, and a hot iron should be drawn over the dried characters.

ALCOHOL HYDROMETER USED WITH ISOPROPYL ALCOHOL DILUTIONS

S. M. of Ohio wants to know if the alcohol hydrometer can be used with isopropyl alcohol dilutions.

Not if you wish to read the numbers as direct percentage. The Tralles scale is calibrated to read ethyl alcohol by volume at 60 degrees F. (15.56 degrees C.). The percentage of ethyl alcohol for the most effective germicidal use is 70% by weight. When the alcoholometer is used a chart is necessary to change the weight volume percent to weight weight percent with correction for temperature.

Dr. Carl Walter, in his recently published book, ''Aseptic Treatment of Wounds'' published by The MacMillan Co., covers this subject quite well in Chapter III entitled Chemical Destruction of Bacteria.

THE VETERANS ADMINISTRATION PHARMACIST

EDITED BY EDDIE WOLFE, CHIEF PHARMACIST, MT. ALTO VETERANS HOSPITAL
WASHINGTON, D.C.

SUGGESTIONS BY VA PHARMACISTS

As a matter of interest to other VA Pharmacists, we are preparing narcotic solutions as described in the July-August BULLETIN 1946 (pages 125-126). We dispense the solution in 10cc calibrated serum vials. As the demand increases, larger vials will be used. We are preparing the solutions so that 1cc contains 1/2 grain codeine sulfate. Morphine solutions are prepared in two strengths, 1cc equaling 1/4 grain, and 1cc equaling 1/6 grain. The records maintained are the same as those kept for tablets. It is a very simple procedure to calibrate the vials at 1cc intervals with a diamond pencil using a 2cc syringe as a measuring instrument. Calibration enables the nurse to maintain an accurate account of solution used.

VA EDITOR'S NOTE: The establishment of such a procedure should be referred to the hospital Committee on Therapeutic Agents.

Arthur J. Davis, Chief Pharmacist
VA Hospital, Ft. Thomas, Ky.

PYRIBENZAMINE OINTMENT (2%)

A formula suggested by Philip H. Millman, Pharmacist at the VA Regional Office in Baltimore, Md.

Pyribenzamine tablets (50mg.)		180
Distilled water		30
Oint. Rose Water		50
Aquaphor		50
Petrolatum alba	q.s.	450

SIG: Triturate tablets thoroughly. Add water to form paste, add aquaphor, cold cream and white petrolatum.

VA NEWS BRIEFS

Veterans Administration distributed a revised list of approved "decentralized-contract" drug items to pharmacists in its hospitals, centers and regional offices, E. Burns Geiger, chief of VA's pharmacy division, announced.

At the request of physicians, VA pharmacists in the field can obtain items on the decentralized contract list directly from manufacturers. Contracts for the drugs--establishing price schedules but not quantities--are arranged in advance by the VA Central Office in Washington, D. C.

Revised lists are distributed throughout VA on April 1 of each year.

President Truman and the Federal Board of Hospitalization have approved the acquisition of nine acres of land in Oklahoma City, Okla. as the site for a 1,000-bed Veterans Administration general medical and surgical hospital, VA announced.

The property adjoins the Oklahoma University School of Medicine on the west, and the State University hospital group, including the University Hospital and the Crippled Childrens' Hospital, on the south.

Construction of the hospital on this site is in keeping with VA's policy of building large new general medical and surgical hospitals as close as possible to medical schools and medical centers, so that VA may utilize the services of local medical personnel as residents, consultants and attendants.

Sixty-three percent more World War II veterans were admitted to Veterans Administration hospitals during 1947 than during the previous year. Admissions of other veterans jumped 32 percent in 1947 over the 1946 figure.

About two out of every three men between the ages of 20 and 35 are World War II veterans.

More than 67,000 applications for dental care were received in February. This total was 6,000 less than the January receipts, which were the highest in six months.

VA must provide medical care for veterans with service-connected ailments. Veterans with non-service-connected disabilities may be hospitalized if beds are available and if they affirm they cannot afford to pay for treatment elsewhere.

If limitations on hospitalization remain unchanged, Veterans Administration predicts a peak load in 1975 of 250,000 patients in its hospitals.

By 1952, veterans and their families will number an estimated 62,300,000--or 43 percent of the nations' population.

There were more than 109,000 patients hospitalized by the Veterans Administration on March 1.

Veterans Administration is training more psychiatrists than all the schools in the country.

Although a mere two percent of the nation's doctors are qualified psychiatrists, 60 percent of the Veterans Administration medical load consists of patients requiring psychiatric care.

One out of every 10 persons in the United States is a veteran of World War II.

CORRECTION

In reference to your article in the November-December issue of THE BULLETIN, I would like to make the following corrections.

THE PHYSICIAN'S BULLETIN will be mailed only to graduate physicians, medical students, hospital and medical school libraries and hospital pharmacies. Publication of SQUIBB MEMORANDA and TODAY IN PHARMACY has been suspended until further notice. The BRISTOL DIGEST, published by Bristol Laboratories, Inc., Syracuse, New York, is an excellent publication which should be added to the list. Publication of the ROCHE REVIEW was temporarily suspended in December 1947.

Joseph E. Birmingham
Chief Pharmacist
VA Regional Office
Roanoke, Va.

PROFESSIONAL DRUG DISPLAY

Mr. C. Baker, medical representative for the Burroughs-Wellcome Co., explains the merits of a council-accepted product to Mr. Harry Taft, Pharmacist, and Mr. Eddie Wolfe, Chief Pharmacist in the Mt. Alto Hospital Pharmacy. The display was reviewed by thirty-five physicians and fifty nurses, along with other members of the hospital staff. The interest displayed by the hospital staff was gratifying to the medical representative and to the pharmacists as it proved that the plan for professional drug displays is a success.

POSITIONS in hospital pharmacy

NORTH CAROLINA . . . WANTED, male or female, pharmacist with hospital experience. This is a 350-bed hospital. Apply to Director, James Walker Memorial Hospital, Wilmington, North Carolina.

ARIZONA. . .A pharmacist is wanted to fill the position of Assistant Chief Pharmacist at St. Mary's Hospital, Tucson. 220 beds at present with plans for an additional 100. Salary open for discussion. Sundays off. Two weeks vacation with pay after one year's employment. One day per month sick leave. Communicate with Mother Ann Lucy, Administrator, or with Sister Elizabeth Joseph, Chief Pharmacist.

OHIO. . .Opening for assistant pharmacist in a 300 bed hospital, 44 hour week, 8:30 to 5:00. Work consists of filling regular stock supplies and prescriptions, and manufacturing. Woman pharmacist preferred. Write to Sister M. Baptista, Personnel Director, St. Elizabeth Hospital, Youngstown, Ohio.

MICHIGAN . . . Wanted Registered Pharmacist for work in pharmacy of a 200-bed general hospital. In application please state years of experience, qualifications and other pertinent information. Apply Superintendent, Pontiac General Hospital, Pontiac, Michigan.

ILLINOIS . . . Wanted Registered Pharmacist, man or woman. One assistant pharmacist in department. Five and one-half day week. No Sunday, night or holiday work. Write Administrator, Children's Memorial Hospital, 707 Fullerton Avenue, Chicago, Illinois.

POSITION WANTED

MISS LORENE J. COLE, 323 State Street, Albany, New York, is interested in a position in New York State outside of New York City. Miss Cole received her B.S. degree in Pharmacy in 1946 and has a New York State license.

PHARMACY POSITONS OPEN IN NAVY

Rear Admiral Clifford A. Swanson (MC) USN, Surgeon General of the Navy, announced that 480 pharmacy officers are needed to fill established billets in 240 inactive volunteer medical reserve divisions. Under present law these officers must be drawn from men currently holding commissions in the Naval Reserve. However, Admiral Swanson pointed out that professionally qualified pharmacists holding line or other staff corps commissions may be reclassified in the Medical Service Corps (Reserve) (Pharmacy) and accepted now into these reserve divisions.

Admiral Swanson also said that the pharmacy section of the recently created Medical Service Corps has opportunities at this time for more than 50 pharmacy officers in the regular service. These officers will be assigned to Naval Hospitals, Naval Medical Supply Depots, Naval Hospital Corps Schools, District Medical Offices, Marine Corps activities and possibly on hospital ships.

The Surgeon General said it is contemplated that pharmacy officers will supervise operating pharmacy services: have assignments in connection with the procurement, distribution, storage and issuance of medical supplies; teaching in Naval Hospital Corps Schools and other similar duties which would utilize their professional training.

Under present law and regulations, active and inactive naval reserve officers, holding B.S. degrees in pharmacy may apply for change of classification and immediate integration into the Medical Service Corps of the regular Navy, in their present temporary rank. Admiral Swanson said that while applications cannot be accepted at this time from other than reserve or temporary officers, legislation has been proposed which, if enacted into law, will permit qualified B.S. degree pharmacists under 32 years of age, to apply for commissioning in the regular Navy, directly from civilian status.

Interested reserve officers may submit a letter of application to the Chief of Naval Personnel via the commandant of the Naval district in which they maintain residence. Commandants will order a physical examination and this will be followed by an interview by a local board which will for-

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NEWS ITEMS

A.S.H.P. COMMITTEE ON MINIMUM STANDARDS MEETS

The committee on Minimum Standards of the American Society of Hospital Pharmacists met at the headquarters building of the American Pharmaceutical Association in Washington on Saturday and Sunday, May 15 and 16. Members of the committee attending were Dr. W. A. Purdum, Chairman; Hans S. Hansen; Russell Fiske; Don E. Francke; E. Burns Geiger; and William E. Woods. Dr. Robert P. Fischelis and Gloria Niemeyer were also present representing the Division of Hospital Pharmacy of the A.Ph.A. and the A.S.H.P. Visitors included Mr. Harold Jones of the Indiana State Board of Health and Mr. Harold Darnell of the A.Ph.A. staff .

During the two-day meeting the committee approved certain broad principles which should be included in a set of minimum standards for hospital pharmacy. These included organization, policies, personnel, facilities, responsibilities, pharmacy committee, and internships. The committee agreed that the present minimum standards for hospital pharmacy as outlined by the American College of Surgeons are too broad to interpret and in formulating new standards, more detailed information should be given.

Each committee member was assigned one phase of the standards to develop more detailed information. It is hoped that the committee can soon approve a set of standards and present to the Policy Committee of the Division of Hospital Pharmacy for approval. Then the standards must be approved by the American College of Surgeons and the American Hospital Association.

CATHOLIC HOSPITAL ASSOCIATION MEETS IN CLEVELAND

An open forum on hospital pharmacy problems will be held at the Pharmacy Section of the annual Catholic Hospital Association's convention which is meeting in Cleveland June 5 - June 11.

A number of Sisters have been asked to participate in the panel discussion which will include the following topics:

Educational trends in Pharmacy
Laws affecting the Pharmacy and the Hospital
Inventory and bookkeeping problems of the Hospital Pharmacy
Hospital Pharmacy Library
Where to find it (Formulae, chemicals, apparatus, etc.)
The A.C.S. point rating system and the Hospital Pharmacy
Manufacture of sterile preparations
Manufacture of non-sterile preparations
The hospital formulary
Pharmacists as teachers in the Nurses Training School
Membership in Pharmacy organizations
Report on the Hospital Pharmacy Division of the A.Ph.A.

A.S.H.P. EXECUTIVE COMMITTEE MEETS

Meeting at the Commodore Hotel in New York City on April 11, the following members of the A.S.H.P. executive committee were present: John J. Zugich, president; Mrs. Margaret Gary, vice-president; Leo Godley, secretary; Sister Mary Etheldreda, treasurer; J.R. Cathcart, chairman of the committee on membership and organization; W. Arthur Purdum, chairman of the committee on minimum standards; and Eddie Wolfe, chairman of the committee on pharmacists in government service. Dr. Robert P. Fischelis and Miss Gloria Niemeyer of the Division of Hospital Pharmacy of the A.Ph.A. were also present.

Subjects to be discussed at this meeting which was called by Mr. Zugich included:

1. Coordination of the American Society of Hospital Pharmacists and the American Pharmaceutical Association Activities.
2. Progress evaluation of the Division of Hospital Pharmacy as related to the American Society of Hospital Pharmacists.
3. Progress reports by committee chariman on 1947-48 objectives as outlined by President Zugich earlier in the year.

DR. DOLEZAL APPOINTED TO A.H.A. STAFF

Appointment of Charles T. Dolezal, M.D., superintendent of City Hospital of Cleveland, as assistant director and secretary of the Council on Professional Practice of the American Hospital Association, has been announced by George Bugbee, executive director. Dr. Dolezal will assume his new duties on May 1, filling the position left vacant with the resignation of Hugo V. Hullerman, M.D.

A graduate of the Western Reserve University School of Medicine, Dr. Dolezal served his internship at City Hospital in Cleveland. In 1929 he joined the visiting teaching staff of the City Hospital by assignment from that school, where he was assistant clinical professor of medicine. He served in this position while in private practice until 1941, when he became assistant medical superintendent at the hospital. In 1942 he was appointed city welfare director of Cleveland, and in 1943 became the first physician ever to hold the post of commissioner of City Hospital.

In his position as secretary of the Council on Professional Practice, Dr. Dolezal will work toward standardization and improvement of procedures of various professional staffs in hospitals, as well as meet with representatives of national organizations of these professions and with hospital officials in the interests of improved efficiency and better care of patients.

NATIONAL HEALTH ASSEMBLY

Delegates to the National Health Assembly representing hospital pharmacy included Dr. W. Arthur Purdum of Johns Hopkins University Hospital and J. S. Mordell, Assistant Director of The Pharmaceutical Survey who attended the section on Hospital Facilities, Health Centers and Diagnostic Clinics. This section was of particular interest in planning for the future of pharmaceutical practice in hospitals. The section's steering committee outlined the development of the hospital in this country, its present place and status and, with the help of the delegates, outlined plans to help chart the course of the American hospital of the future in order that adequate hospital service may be made available for all people.

The Assembly which was held in Washington May 1 - 4 was called by the Federal Security Administrator, Oscar R. Ewing, at the request of President Truman, to establish the widest possible "area of agreement" between groups with different viewpoints and to draw up a 10-year program of national health goals.

MICHIGAN ANNOUNCES GRADUATE PROGRAM IN HOSPITAL PHARMACY

The University of Michigan announces a two year program for graduate study and internship in hospital pharmacy to be given cooperatively by the Graduate School, the College of Pharmacy and the Department of Pharmacy of the University Hospital. Interns will devote one-half time to graduate study and one-half time to hospital pharmacy training. Successful completion of the two year program will lead to the degree of Master of Science in pharmacy, to be awarded by the University, and a Certificate of Hospital Pharmacy Internship to be granted by the Hospital. The program will begin with the opening of the 1948 fall semester, although the appointments will be made on or before September 1.

During the training period an allowance of $100.00 per month will be provided by the hospital. This allowance will be increased to $200.00 during the summer months. Tuition fee for the course will be approximately $50.00 per semester for Michigan residents and $100.00 for non-residents.

The two year program will afford a well rounded training for the practice of pharmacy in hospitals. Included among the specialized graduate courses offered are: Hospital Pharmacy Administration and Policy, 3 hours; Preparation of Parenteral Fluids, 3 hours; Special Problems in Manufacturing Pharmacy, 2 hours; Seminar in Hospital Pharmacy, 4 hours (1 hour per semester). Students whose background in pharmacology is considered inadequate will be advised to take 5 hours of Medical School Pharmacology. Other courses will be elected after consultation between the student and adviser.

The training program in the hospital pharmacy will be so arranged as to provide a rotating internship, thus permitting the intern a thorough training in hospital pharmacy administration, dispensing, extemporaneous compounding, manufacturing in large as well as small quantities, the preparation of parenteral solutions, the preparation of laboratory reagents and other phases of hospital pharmacy practice. The intern will also study the inter-relationships between the Pharmacy and other departments of the hospital. The intern will be assigned to take care of certain emergency calls when the Pharmacy is closed.

Applicants for the program must possess an accredited Bachelor's Degree and should have essentially a "B" average. Application may be made by letter to Professor Charles H. Stocking, Acting Director, College of Pharmacy, University of Michigan, Ann Arbor. The applicant should submit an official transcript of his college record, a small, recent photograph, and a letter of recommendation from the dean of his college. Only a limited number of applicants can be accepted.

TRI-STATE HOSPITAL ASSEMBLY MEETS

Hospital pharmacists participated in the eighteenth annual convention of the Tri-State Hospital Assembly held on May 3, 4, and 5 at the Palmer House, Chicago. The Conference of Hospital Pharmacists sponsored by the American Society of Hospital Pharmacists, Illinois Chapter, and the Pharmacists' Section of the Assembly was held on the afternoons of May 4 and 5. Mr. Malcolm Hutton, chief pharmacist at Presbyterian Hospital in Chicago, served as chairman of the Pharmacists' Section.

Greetings from the Tri-State Hospital Assembly were extended by Mr. Charles J. Hassenauer, administrator at Garfield Park Community Hospital. Greetings from the American Society of Hospital Pharmacists, Illinois Chapter, were extended by its President, Mr. Louis Gdalman of Chicago. Mr. Gdalman set forth the aims of the Society and outlined the benefits derived from a well organized and active group.

An interesting paper on "The Education of a Hospital Pharmacist" was presented by Dr. H. George DeKay, Professor of Pharmacy at Purdue University. Mr. Charles F. Lanwermeyer of Abbott Laboratories spoke on "Some of the New Drugs for Hospital Pharmacy." "The Hospital Administrator and the Hospital Pharmacist" was presented by Mr. Leo M. Lyons, administrator of St. Luke's Hospital in Chicago, and Dr. Byrl Benton, Associate Professor of Manufacturing Pharmacy at University of Illinois College of Pharmacy, spoke on "Manufacturing in the Hospital Pharmacy." A discussion led by Chairman Hutton followed.

During the business session, the following new officers were elected: Chairman Sister M. Stephanina, St. James Hospital, Chicago Heights; and Secretary-Treasurer Elnorah Drury, Alton Memorial Hospital, Alton.

Members of the American Society of Hospital Pharmacists are reminded that 1948 dues are now due. If you have not already paid your annual dues in the Society and in the American Pharmaceutical Association, you will want to forward your check to the Division of Hospital Pharmacy, American Pharmaceutical Association, 2215 Constitution Avenue, N. W., Washington, D. C. in order that your name will be retained on the membership list.

Positions - continued from page 137

ward the application with recommendation. Letters of application should show age, date of reporting for active duty, date of present rank, previous duty assignments, education, civilian experience and other pertinent data. The letter should indicate applicant's present status, for example, inactive Naval Reserve, and also classification and file number. Additional information can be obtained from any office of Naval Officer Procurement or District Headquarters. Applications should not be directed to Washington.

NEW JERSEY. . .The Englewood Community Hospital, a 240 bed institution in northern New Jersey, has an opening for a well-qualified individual as chief pharmacist. The Pharmacy is soon to be moved to larger quarters and the department presents a challenging opportunity for a progressive pharmacist. One month vacation with pay is allowed after a year of service, two weeks sick leave is granted after three months service. Salary adequate. Apply to Corinne Olson, Personnel Officer, Englewood Community Hospital, Englewood.

OHIO. . .The 360 bed Aultman Hospital in Canton is in need of a staff pharmacist. The salary will depend upon the qualifications and experience of the individual selected. For further information regarding conditions of employment contact Miss Verla L. Walters, Personnel Director, Aultman Hospital, 625 Clarendon Avenue, S. W., Canton.

MISSOURI. . .A position for a registered pharmacist is open at St. John's Hospital in Joplin. A woman is preferred. For further information write to Sister Mary Loyola Keenan, chief pharmacist at St. John's Hospital.

NORTH CAROLINA. . .The City Memorial Hospital of Winston-Salem would like to employ a hospital pharmacist. The salary is open. For further information contact C. K. Shiro, Administrator.

DEATH

Mr. C. T. Crowley, chief pharmacist of the Winnipeg General Hospital died on April 17, 1948.

ORGANIZATION NEWS

THE MICHIGAN CHAPTER OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS met March 4 at Holy Cross Hospital, Detroit, with guest speaker Albert L. Picchioni giving a talk on "Isopropanol" with illustrated samples and formulas including isopropanol.

At the group's April meeting, a discussion on salary trends took place. After a short discussion it was decided to take a salary survey at the meeting. The results were as follows:

	Chief Pharmacist	Pharmacist
Highest Salary	$418	$368
Lowest Salary	$200	$200
Average Salary	$345	$279

Average hours worked per week, 41.5.

President Lyon discussed the possibility of the appointment of a hospital pharmacist to the State Board and Mr. Tennant of Ford Hospital was asked to obtain information on the method used in obtaining Medical Board appointments.

THE ASSOCIATION OF HOSPITAL PHARMACISTS OF THE MIDWEST met January 17 at Immanuel Hospital in Omaha, Nebraska with Sister Ruth as Hostess. Fifteen members were present. Dr. Allen, pathologist at Immanuel Hospital, lectured on "Toxicology" after which an informal discussion was held.

The March meeting was held on the thirteenth at the Clarkson Hospital, Omaha, with fifteen members and seven guests present. Senior students at Creighton University were guests at the meeting. Dr. Elbert Voss, head of the Biological Science Department of Creighton College of Pharmacy spoke on Estrogens. This was followed by an informal discussion in regard to the needed changes in Pharmacy Curriculum.

THE SOCIETY OF HOSPITAL PHARMACISTS OF GREATER CINCINNATI held its March meeting at the Jewish Hospital with Mr. Pat Murphy, Chief Pharmacist, as host. During the program a round table discussion was held at which time the following question was asked: "How Many Beds Should a Hospital Have in Order to Employ a Pharmacist?" It was a consensus of opinion of this group that a hospital with 30 beds should employ a pharmacist. The discussion also included questions in regard to the Narcotic and Alcohol Laws and it was agreed that there should be uniform State Laws to cover narcotics and alcohol.

Meeting at the Christ Hospital where Miss Alice Ritchie is Chief Pharmacist, the April meeting included a discussion of new drugs by Mr. Irvin Weinberg. A talk on Narcotic Control in the Hospital was given by Mr. Lawrence Brunner followed by a round table discussion. The group was then shown through the pharmacy of Christ Hospital which has recently been remodeled.

THE CLEVELAND SOCIETY OF HOSPITAL PHARMACISTS met at Cleveland City Hospital on February 25 with Mr. R. Sherwood and G. H. Brown, graduate students in hospital pharmacy, speaking on "Review of the Literature Concerning the Preservation of Ophthalmic Solutions." The round table discussion which followed showed that eye solution problems are of interest to many hospital pharmacists.

THE MASSACHUSETTS SOCIETY OF HOSPITAL PHARMACISTS met the evening of March 17 at Hotel Statler in Boston with Mr. Robert Perchard, Medical Service Director of E. R. Squibb & Sons, as guest speaker. He spoke on the various aspects of Dicumarol and other new drugs of interest to the hospital pharmacist. Twenty-seven members were present and four new members were accepted in the Society.

Mr. John Murphy, Chief Pharmacist of Massachusetts General Hospital, Boston, recently attended the spring meeting of the American Pharmaceutical Manufacturers' Association in New York City. He discussed the hospital pharmacists' views on some practices of the drug manufacturer.

THE ILLINOIS CHAPTER OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS held their March meeting at the Chicago Hospital Council with Dr. M. H. Kreeger, Superintendent, Michael

Reese Hospital, as guest speaker. Mr. Isador Weber gave a short talk about the hospital pharmacy from a pharmacist's viewpoint which was followed by a discussion.

The Annual Spring Dinner Meeting on April 7 was held at the Illinois Athletic Club as guests of E. R. Squibb & Sons. Dr. L. H. Wright, a foremost leader in his field, gave a talk on "Modern Anesthetics."

THE OHIO SOCIETY OF HOSPITAL PHARMACISTS meeting in conjunction with the Ohio Hospital Association in Columbus on April 7 elected the following officers for the coming year: President Charles Nevel; President-Elect Thomas E. Sisk; Vice President Arthur Davis; Corresponding Secretary Marguerite McNeal; Recording Secretary Sister Mary Florentine; and Treasurer Basil Valenti. Included also in the business meeting were reports of the committee chairmen. Following the report of the Chairman of the Board of Pharmacy Committee a motion was passed that every governor of the State of Ohio be made an honorary member of the Society during his tenure of office.

At the noon meeting the speaker was Dr. Robert P. Fischelis, Secretary of the American Pharmaceutical Association. He discussed the activities of the Division of Hospital Pharmacy of the A.Ph.A. in regard to coordinating activities of the American Pharmaceutical Association and the American Society of Hospital Pharmacists.

Other speakers on the program included Dr. Arthur P. Wyss, Dean of the School of Pharmacy, Western Reserve University; Robert M. Porter, Superintendent of Children's Hospital in Columbus; and John J. Zugich, President of the American Society of Hospital Pharmacists. Mrs. Evlyn Gray Scott, Chief Pharmacist at St. Luke's Hospital at Cleveland presided as chairman of the round table discussion on "How Can the Hospital Pharmacist Meet the Rapid Increased Demands on Hospital Pharmacy."

THE SOUTHERN CALIFORNIA CHAPTER OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS held their second bimonthly meeting at the Queen of Angels Hospital, March 10, with Sister Junilla presiding. Sister Junilla spoke briefly on the relation of the hospital pharmacists' society to the A.Ph.A., emphasizing the unity of aim of all hospital pharmacy organizations. She also pointed out that qualification for membership in the chapter is simply that of good professional standing and employment in a hospital for one year previous to application. Alvah Hall, Dean of the College of Pharmacy at University of Southern California spoke briefly. He emphasized the need for cooperation between all branches of pharmacy. A proposal was introduced to make Dean Hall an honorary member of the Chapter and Mr. Roland Rosaur and Mr. Ben Howiler associate members. The Chapter voted to accept.

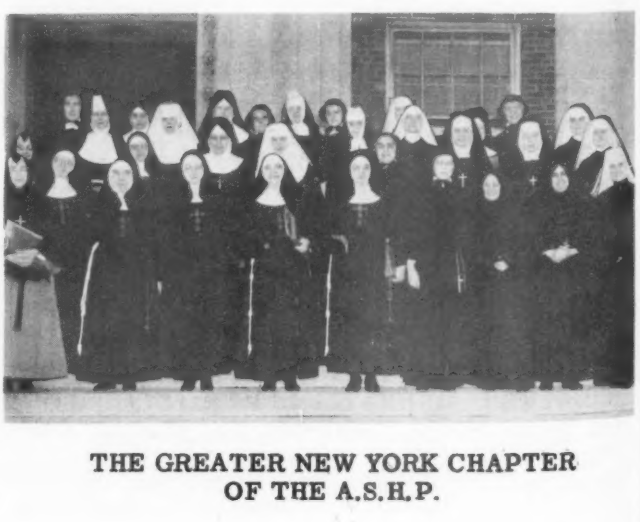
Mr. Charles Hagan reported on plans for the Hospital Pharmacy section of the Western Hospital Association Convention to be held in Los Angeles April 18-21. This section is scheduled for April 21, in the afternoon.

The speaker of the evening, Mr. Robert Artis, District Supervisor of the Western Division, Bureau of Narcotics, gave a talk on "The Harrison Narcotic Law as it Affects Hospitals."

THE GREATER NEW YORK CHAPTER OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS met on February 18 with guest speaker Sister Francis Regis, Superintendent of St. Catherine's Hospital, Brooklyn speaking on "The Administrator Views Hospital Pharmacy Management." The second speaker, Sister Mary Etheldreda, Chief Pharmacist at St. Mary's Hospital in Brooklyn spoke on "The Hospital Pharmacist, An Asset to the Institution."

Sister Bernardine of St. Vincent's Hospital, New York, reported the successful administration of large doses of penicillin in saline solution with its effect prolonged for eighteen or more hours. Sister Nicodema, of St. Anthony's Hospital, Woodhaven, presented an interesting account of the use and resulting action of Streptomycin on tuberculosis patients.

The March meeting was held at St. Vincent's hospital with Sister Mary Rita of St. Peter's Hospital, reading a paper on "Para-hydroxybenxoic Esters." A nominating committee for the coming election was appointed including Sister Alice Loretto, Sister Cecilia Mary and Sister Mary Rita. This group will be guests of the Merck Chemical Company on a tour of their plant.



THE GREATER NEW YORK CHAPTER OF THE A.S.H.P.

THE HOSPITAL PHARMACISTS ASSOCIATION OF GREATER ST. LOUIS recently elected the following new officers: President Norman Hammelmann of Veterans Hospital; Vice-President Mrs. Elnorah Drury, Alton Memorial Hospital; Secretary Herbert Ludwig, St. Luke's Hospital; and Treasurer F. M. Rudi, Missouri Pacific Hospital.

THE SOUTHERN CALIFORNIA CHAPTER OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS held a luncheon meeting at the Clark Hotel in conjunction with the Hospital Pharmacists Association of Southern California in Los Angeles on April 21, 1948.

Mr. Wells, President of the San Francisco Chapter of the American Pharmaceutical Association, and Mr. Baty professor of Pharmacy at the University of Southern California, were guest speakers. On adjournment of the meeting, the group proceeded to the Biltmore Hotel to attend the Western Hospitals' Association's Eighteenth Annual Convention.

THE LOUISIANA SOCIETY OF HOSPITAL PHARMACISTS recently elected Miss Valerie Armbruster, chief pharmacist at Charity Hospital, as president for the coming year. Other officers elected were: Troy L. Carter, Jr., as vice-president; Miss Alice Anna Poirrier as secretary; and Albert P. Lauve as treasurer.

THE WISCONSIN SOCIETY OF HOSPITAL PHARMACISTS elected the following officers at their April meeting: President William Benka, Milwaukee County General Hospital; Vice-President Sister Mary Agnese, St. Joseph Hospital; and Secretary-Treasurer Mrs. Doris Shimon, Deaconess Hospital.

The May meeting included a tour of the County Institutions, including the General Hospital, the Tuberculosis Sanitarium and the Hospital for Mental Diseases.

THE CITY OF WASHINGTON CHAPTER OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS held their May meeting on the 28th in conjunction with a meeting of the A.Ph.A. branch. Dr. W. Arthur Purdum, president-elect of the A.S.H.P. reported on the activities of the Society. During the business meeting the following officers were elected: President E. Burns Geiger of the Veterans Administration; Vice-President Sara Eckbert of Walter Reed Hospital and Secretary-Treasurer Eddie Wolfe of Mt. Alto Hospital.

C. Joseph Vance, Mrs. Joyce Gaines
Albert P. Lauve, Miss Johnnie Crotwell

SOUTHEASTERN HOSPITAL PHARMACISTS' ASSOCIATION MEETS

Mrs. Joyce Gaines, chief pharmacist at Georgia Baptist Hospital, Atlanta, was installed as president of the Southeastern Hospital Pharmacists' Association at their third annual meeting recently held in conjunction with The Southeastern Hospital Conference at Biloxi, Mississippi. Other officers installed were: C. Joseph Vance, Administrator of South Highland Infirmary, Birmingham, as Vice-President; Miss Johnnie Crotwell, Chief Pharmacist, Druid City Hospital, Tuscaloosa, Ala., as Secretary-Treasurer; and Mr. Albert A. Lauve, Chief Pharmacist of Mercy Hospital, New Orleans, as President-Elect.

In the general assemblies of the hospital conference, the pharmacists were well represented by having two papers presented. Mr. C. Joseph Vance, presented a paper on "Can a Hospital Afford Not to Have a Pharmacy?" and Mr. J. W. Holloway, Morrell Memorial Hospital, Lakeland, Florida read a paper on "The Pharmacy - A Revenue Producing Department."

Approximately 20 hospital pharmacists from eight states enjoyed the two-day meeting in Biloxi. The outgoing officers were highly commended for their efforts and achievements during the past year.

NEW MEMBERS

ARIZONA

Sister Elizabeth Joseph
St. Mary's Road
Tucson

CALIFORNIA

Henry Wallace Beard
581 Sawyer Street
San Francisco

Mary Carolyn Braiden
203 S. Hoover
Los Angeles

Philip L. Chiles
335 E. 61st Street
Los Angeles

Philip A. Crosby
1155 W. Badillo
Covina

John P. Davalle
3141 Carlin Avenue
Lynwood

Margaret Duggan
1537 W. 58th Street
Los Angeles

Alice de Jarnette Hooper
5152 Oakland Street
Los Angeles

Alice Mary Lafferty (Mrs.)
133 N. Catalina Street
Los Angeles

Florence Louise Martin
846 W. Santa Barbara
Los Angeles

Arthur Aaron Rosen
528 San Benito Street
Los Angeles

Beatrice C. Ross
18967 Stanton Avenue
Los Angeles

L. Vernon Schutt
4844 - 73rd Street
La Mesa

Alice Olman Spear
4284 Kraft Avenue
No. Hollywood

COLORADO

Nathan L. Mozer
1240 Sherman Street
Denver

CONNECTICUT

Shirley Mae Bennett
Pleasant Street
Chester

DISTRICT OF COLUMBIA

Bernard Melkon
1711 Pennsylvania Avenue, N.W.
Washington, D. C.

Ida Efros Silber
Gallinger Hospital
Washington, D. C.

GEORGIA

Vivian Cato
300 N. Boulevard
Atlanta

Iris June Snoddy
Emory University Hospital
Emory University

ILLINOIS

Charles J. Leone
1023 N. Springfield Avenue
Chicago

John J. Reinhofer
2744 Pine Grove Avenue
Chicago

IOWA

Emmett H. Beard
700-½ E. Bremer
Waverly

Marybeth Hartman
3 E. Davenport
Iowa City

KENTUCKY

John H. Voige, Jr.
18 Lockwood Avenue
Fort Thomas

LOUISIANA

Alvin J. Ferrer
551 Sizeler
New Orleans

Shirley M. Hebert
125 Federal Avenue
Morgan City

Henry S. Jackson
1125 Third Street
New Orleans

Tom Neely, Jr.
910 S. Carrollton
New Orleans

Louis A. Wilson 611
6115 Coliseum
New Orleans

MASSACHUSETTS

Maryrose Coffey
42 La Foye Street
Brockton

Edward Nicholas Deeb
17 Bond Street
Boston

George I. Freedman
85 Montvale Road
Newton Center

John T. Karman
New England Deaconess Hosp.
Boston

Bruce A. Kenneth
18 Prospect Avenue
Brockton

Jean M. Lynch
4 Butler Avenue
Maynard

William F. Martin
New England Deaconess Hosp.
Boston

Rosalie Shapero
759 Chestnut Street
Springfield

MICHIGAN

Alvie Raymond Brawner
92 Oak Street
Battle Creek

James H. Huntsman
6545 Mead
Dearborn

MINNESOTA

Forrest H. Stapel
Veterans Hospital
Minneapolis

NEBRASKA

Lillian Dorsey (Mrs.)
2432 Parks Street
Omaha

NEW JERSEY

Genevieve D. Slaughter
Atlantic City Hospital
Atlantic City

Sister Mary Stanisia
St. Michael's Hospital
Newark

NEW YORK

Florinel W. Ball
525 E. 68th
New York

John Michael Bobel
2351 32nd Street
Astoria, Long Island

William I. Green
4709 Skillman Avenue
Sunnyside, Long Island

Robarts Learned Proper
58 Vanderbilt
Staten Island

Gertrude H. Mroczynski
577 Oliver Street
North Towanda

Leo Weiner
511 Barbey Street
Brooklyn

OHIO

William G. Kolbe
10907 Hullane
Cleveland

Louis G. Maniates
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Cleveland

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Woodward

PENNSYLVANIA

John M. Folmer
822 Locust Street
Reading

Clara Adi Mehr
740 East State
Sharon

Frederick M. Scholl
Temple University Hospital
Philadelphia

TENNESSEE

Carmen A. Carrato
U.S. Marine Hospital
Memphis

VIRGINIA

Guy H. Trimble
2532 S. Adams Street
Arlington

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2031 Kingsway
New Westminster